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USSR Report

TRANSPORTATION

No. 90

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EARLY HISTORY OF VOLGA MOTOR VEHICLE PLANT TRACED

Origination of Idea

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 1, 82 pp 154-170

[Article by Boris Katsman]

[Text]

It is written in the directives of the 23rd CPSU Congress: "The automotive industry should achieve rapid development. It is planned to increase production of trucks 1.6 to 1.7-fold and of compact cars almost fourfold. The corresponding plants must be expanded and a new automotive plant must be constructed to do this."

The increased needs of the national economy and of the Soviet people and the directions of the party toward rapid technical re-equipping of the national economy and toward progressive changing of its structure were behind these capacious lines.

Motor vehicle construction is a large consumer of the most diverse materials and make-up articles. It may become a powerful catalyst for technical progress in many sectors of industry and may bring new sectors of production to life. Mass production of motor vehicles places important national economic problems in the field of service, highway construction and social development.

All this predetermines the nature of the future automotive plant. Thus arose the idea: to construct within the shortest possible deadlines a large compact automotive plant which would embody the latest advances of worldwide technology, equipment, production management and organization of it.

And this idea was realized. The plant was created, created on an uncompromising basis, without giving way at all to the universal mass of objective and subjective difficulties which were generated by our skills and by the achieved level of development and crowned by our previous achievements.

Chapter 1. Partners

Why then is a partner necessary? The recruitment of foreign companies in construction of the Gor'kiy Automotive or of the Stalingrad Tractor Plants is understandable. At that time it was essentially necessary to develop new sectors of machine building, there were no specialists and experience and the domestic machine tool building base was weak. Everything is different now. And even so, again there is the partner.

We needed a plant corresponding to the modern worldwide level, capable of becoming the catalyst of technical progress in different sectors of the national economy and of expanding within the shortest deadlines the compact automobile market. The most developed automotive powers of the world are not closed in their own national markets. You will not see only "one's own" equipment, only "one's own" technology, only "one's own" design and moreover, only "one's own" organization of production in a single automotive plant of the world. Large highly automated mass production is now impossible without the accumulated advances of worldwide science and technology.

True, the automotive industry was created during the years of Soviet power in our country. However, trucks played the predominate role in the structure of automotive output for understandable reasons. The output of compact automobiles reached only 230,000 units annually by the beginning of construction of the Volga Motor Vehicle Plant and production of them was series or in the best case of large-series nature.

Mass production of compact automobiles has its own characteristics. The world's leading automotive firms experienced all the complexity of organizing this production, accumulated extensive experience and thoroughly studied its difficulties. They knew the capabilities of worldwide machine building and developed an extensive range of new materials for manufacture of modern motor vehicles and that meet the requirements of international standards.

The need for a partner ensued from the idea.

The next question is why the Italian company Fiat rather than one of the American "big three" became this partner? After all, Fiat is far from such giants as General Motors, Chrysler and Ford. Why not another European company or finally, why not Japan?

Not only the purely engineering and organizational capabilities of companies were significant in selection of a partner. Those years were noted by the tensions of international relations. Could an American partner be reliable in cooperation during the worldwide slowdown of compact automobile construction? There were doubts.

Events confirmed the correctness of refusing this version with all its engineering attractiveness and readiness of American companies. We recall that the U.S. State Department placed sanctions against sales of American equipment for the automotive complex on the Volga under construction.

The Italian company Fiat attracted attention both by international and in organizational and engineering concepts. At the beginning of negotiations on cooperation, this company occupied second place in Europe in the total production of motor vehicles, being inferior only to Volkswagen. However, the path of development of the company had already been clearly reviewed at that time. And actually, it became known in January 1968 that Fiat had emerged in first place in Europe by this indicator and to fourth place in the world.

The negotiations on cooperation with Fiat in development of a complex for production of compact automobiles was preceded by scientific research cooperation in the field of automotive construction. It permitted Soviet specialists to become thoroughly acquainted with the company's experience, its plans for the future and advances in the field of automotive construction.

The stockholder society of Fiat was confirmed in 1899. The Fiat Company was transformed into an enormous concern during the 70 years of its existence. Its plants produce steel, cast iron, other metals and finished products for all types of ground, maritime and air transport. Approximately 150,000 persons are engaged at the company.

After World War II, Professor Vittorio Valetta became the actual director of Fiat. He managed the capital reconstruction of production, expanded the enterprises of the company with the assistance of American loans and foresaw the industrial boom during the middle 1950s. Capital reconstruction of production brought the company to the leading position in Europe, permitted it to emerge in a new position of quality--a large supplier of equipment--and made it possible to conclude a number of advantageous and prestigious contracts, the largest of which was the agreement on cooperation to develop a complex for production of compact automobiles in the USSR.

On 15 April 1966 a Soviet delegation headed by Minister of the USSR Automotive Industry A. M. Tarasov flew to Rome. The results of its joint work with Fiat specialists were recorded in the "Protocol of negotiations between the Soviet delegation and Fiat shareholders on cooperation in the field of developing the design of a motor vehicle, design of a motor vehicle plant and its construction in the USSR."

In February 1966 the company presented the "Preliminary design of the plant for manufacture of mid-size motor vehicles." The design evoked a number of comments from Soviet specialists. These comments primarily concerned expansion of the plant's composition: inclusion of a large engineering center in the service of the chief designer with the necessary experimental base and laboratories, services of the chief technician and of the chief metallurgist with laboratories. It was also suggested that a tool and die plant be included with shops for manufacture of dies, press molds, models, metallurgical equipment, accessories for machining and testing, complex and special types of cutting tools and gauges and also the laboratories required for this. The output of tools and equipment had to be considered in volumes that guarantee not only the needs of current production but re-equipping of the plant to produce one new model annually. Shops for capital and routine repair of equipment, on manufacture of spare parts for equipment, a warehouse and expedition of spare parts to motor vehicles and production of a number of parts were not provided in the Preliminary Design. The Soviet delegation also insisted on the fact that the general layout of the plant permit the capability of further expansion of the production shops.

The procedure for fulfilling the design work was agreed upon. The contract design was developed by Fiat with the participation of consulting specialists of Soviet planning organizations and with respect to the specifications worked out by the Soviet side. Completion of the contract design in the part of the general plan, the estimated financial calculation, the energy part, outside transportation, water supply and sewers and also all agreements were supposed to be made by the USSR planning organizations.

Fiat took on itself delivery of the complex equipment and fittings. The Soviet side retained for itself the right to determine the nomenclature of this equipment, which enterprises of the USSR and of the socialist countries would deliver.

The section of the protocol in which the obligations of Fiat were stipulated in transfer of documentation was very important. The transfer of design and technical documentation and all rights to patents, licenses, "know-how," production experience and technical information of the firm itself and of that belonging to third parties and acceptance by Fiat of obligations to regulate all possible claims and requirements with regard to the use of these patents and licenses by the Soviet side was intended. This section also envisioned patron installation of equipment and assistance in starting-adjusting work with the lines and individual types of equipment being brought up to design capacity and with a guarantee of the quality of articles by specifications, use of the required number of Soviet specialists for participation in design of the plant and of the vehicle and for training at Fiat enterprises and having an influence in organization of their training at enterprises of the supplier companies.

Fiat purchases of equipment, licenses and long-term goods from Soviet foreign trade organizations for a sum comprising a specific percentage of the cost of the equipment purchased by us from Fiat on the basis of long-term contracts were provided.

The right of Soviet organizations to sell the motor vehicles and their parts manufactured in the future motor vehicle plant, not only in the USSR but on markets of third countries, was stipulated.

The financial agreement provided for payment of 90 percent of the cost of delivered machines and equipment, transferred rights, technical documentation and services rendered by Fiat and other Italian companies with regard to construction of the motor vehicle plant in the USSR on the basis of long-term credits.

The required number of motor vehicles was transferred to the Soviet side to determine the necessary changes in design of the Fiat-124 with respect to its operating conditions in the USSR. Testing of them and preparation of the General Agreement--the official legal document--for conclusion that determine the bases of the cooperation were begun.

The Soviet delegation consisting of 10 persons, who encountered specific difficulties, flew to Italy to work out its design.

The first group of questions concerned the design of the engine. The Soviet party insisted on a significant change of it for increasing the wear stability of the engine cylinders and of changing the arrangement of the camshaft. The Italian party defended the engine of the Fiat-124 model and conducted new tests of it on an urgent basis, the results of which however did not convince the Soviet party. The Italian party argued its position with the fact that acceptance of the Soviet suggestions was equivalent to development of a new engine and this would result in disruption of the deadlines for putting it into production. Professor Valetta entered the negotiations and a compromise version was adopted as a result.

Discussion of the second debatable group of questions--on licenses and patents--was heated. The Soviet party wanted Fiat rather than individual companies to become the general supplier of all documentation, licenses and patents. A list of articles of related plants consisting of 72 names was made as a result of numerous meetings, by which Fiat was obligated to transfer documentation at its disposal--drawings of articles, engineering norms for acceptance and testing and drawings for capital devices. Moreover, Fiat was obligated to make its own laboratories available for tests of the articles of plants during development.

The third group of questions concerned the financial part of the agreement. The size of the bonus requested by Fiat was considerably reduced as a result of negotiations.

The general agreement on development of a plant for production of compact automobiles in the USSR was signed in Moscow on 15 August 1966 with an effective period of 8 years from the date of signing. This document specified organization of cooperation, rights, obligations and responsibility of the parties.

A decree "On construction of VAZ" was issued in July 1966. It obligated the USSR Gosplan and the Ministries of the Chemical, Electrotechnical, Light, Timber, Pulp and Paper and Woodworking, Petrochemical, Radio, Construction Materials and Ferrous and Nonferrous Metallurgy Industries to guarantee organization of production of complete sets of articles, semi-finished products, metal and materials required to produce 600,000 compact automobiles annually at the motor vehicle plant in Togliatti and to meet the requirements of all enterprises of the Ministry of the Automotive Industry for these articles in 1967-1969 according to the specifications of the Ministry of the Automotive Industry. Construction of the motor vehicle complex at Togliatti was entrusted to the USSR Ministry of Power and Electrification.

Chapter 2. The Design

The document which determined the main ideas of organizing the design and construction of VAZ, which gave an enormous time advantage, was called "On primary measures for construction of the Volga Motor Vehicle Plant."

The USSR Council of Ministers entrusted the duties of general designer of the Volga Motor Vehicle Plant to the State Institute on Planning of Plants of the Automotive Industry--Giproavtoprom, and complex fulfillment of the planning and construction projects of the new part of Togliatti, including development of detail plans, was entrusted to the State Committee on Civil Construction and Architecture attached to USSR Gosstroy. Performance of survey and planning work on facilities of the automotive complex was entrusted to 38 organizations of 17 ministries and agencies.

The USSR Council of Ministers authorized the planning organizations to work out, with the agreement of the Ministry of the Automotive Industry, the detail plans for all facilities up to confirmation of the contract design for construction of the plant. This determined a completely new procedure in organization of planning work and construction--a joint procedure. It differs from the procedure adopted in our country when performance of each subsequent stage can begin only after consideration and confirmation of the previous one.

Parallel management of the contract design and detail plan, construction and installation work was also practiced earlier in our country, for example, in construction of gas pipelines. However, the method of parallel planning and construction was realized for the first time on such a scale and with such daring.

Usually approximately three years passes on development of the contract design, detail plans, expert opinions and confirmation of the plan before the beginning of construction. This period of waiting did not occur in the history of development of the Volga Motor Vehicle Plant.

Estimates of both its areas, equipment and cost were contained in the very first plans of the plant ("Preliminary design" and "Refined suggestions" to it). They relied on a known technology, design of the motor vehicle and the program for producing it. As indicated by practice, the preliminary estimates deviated from those which were made during the final stage of the plan by no more than 20 percent. Having consolidated data on the production part in hand, one could carry out consolidated calculations of the need for electric and thermal energy, water, gas, sewer systems and so on. They were the basis of the contract design of the plant and became the basis for the work of Soviet planning organizations in design of facilities outside the plant even before the full contract design of the plant was worked out. But this was not the main thing.

The main condition that guaranteed the possibility of parallel planning and construction was the decision to use general-purpose buildings and structures. Their energy and engineering support were suitable for any automotive production facility. Minimum expenditures for re-equipping would be required in case it was changed. This decision was especially appropriate in construction of compact automobiles with the inherent rapid change of design and technology.

The status of the directorship was also determined at that time: "to provide the funds to maintain the board of directors without regard to limits for maintenance of the board of directors of the enterprise under construction in a summary estimate-financial calculation for construction of the Volga Motor Vehicle Plant."

A week prior to this, the deputy minister of the USSR Automotive Industry. Viktor Nikolayevich Polyakov, was appointed the general director of the Volga Motor Vehicle Plant under construction. The unusual status of management to a great extent determined not only the successful design work, but also the success of the plant construction. The director's personality and his work methods also played an important role in this.

Three geographic locations were key locations in work on the design: Turin, Moscow and Togliatti.

Turin

The Soviet representatives and the Division of the USSR Trade Delegation in Italy were confirmed according to the general agreement in Turin. The representatives of the All-Union Association Avtropromimport worked in the division of the trade delegation.

A technical delegation of specialists of the Ministry of the Automotive Industry, the Volga Motor Vehicle Plant and planning organizations was appointed for direct participation in working out the contract design and later the performance design in Turin. Its composition was changed as a function of the problems of each phase. During the period of organizing work on the contract and performance designs of the plant, development of the automobile design, consideration of the proposals of the companies for delivery of equipment, concluding contracts for delivery of this equipment and its acceptance, the technical delegation consisted of representatives of practically all producers and functional administrations of the future plant formed in the board of directors of the enterprise under construction due to the special status according to it and also representatives of planning organizations recruited to design and test the automobiles. The delegation included representatives of the design and production organizations, enterprises and apparatus of the equipment, tool, makeup articles and materials supplier ministries.

The Soviet technical delegation left for Turin in October 1966.

Fiat specialists worked intensively on the contract design. All the principle decisions introduced into the contract design were discussed with the designers of Giproavtoprom and with the leading production specialists of the future plant.

The discussion proceeded for a week in a working procedure and on Saturdays disagreements were brought to the level of the heads of the Soviet technical delegation and the corresponding managers of Fiat, where coordinated decisions were made. The opinion of the general director, who continuously coordinated the course of work on the design by detailed memoranda, telephone conversations and if necessary personal meetings, was requested on especially important questions.

In April 1967 specialist of Gosekspertiza [State Experts] under USSR Gosstroy, the Department of Labor Protection of AUCCTU and the Administration of Fire Protection, USSR MVD [Ministry of Internal Affairs] were sent to Turin. They acquainted themselves with the contract design of the plant as preparation for its consideration and confirmation, on which much time is usually spent.

The protocol for acceptance of the contract design with a number of comments which were supposed to be considered upon fulfillment of the performance design of the plant by Fiat, was signed in July 1967. Sent to Moscow in seven stages, the contract design consisted of 30 volumes and contained detailed explanatory notes and an appendix to each volume.

The structure of the plant selected in the contract design encompasses the entire complex of production processes from refining the raw material to assembly of the automobile and is a typical vertical diagram with complete production cycle.

The schematic diagram of the general plan of the plant was constructed so that the length of transport ties between the buildings was reduced to a minimum. Each building that supplied assembly was arranged so that any "loops" of transport mainlines were eliminated. The buildings were arranged with ample space, which permits additional construction and a one-third increase of the plant's production capacity. Locations for this proposed construction were designated beforehand on the layout of the general plan.

The scheme of organization of management was based on centralization of strategic functions in a general board of directors of the complex. The following were centralized:

contract design and generally problems of technical policy which should correspond to the general plan of development in different plants and subdivisions;

planning of plant production and organization of sales of products and purchases of materials;

basic questions of economic policy such as determination of the system of organization and payment of labor, methods of planning, consideration and intra-cost-accounting, systems of material and moral stimulation of labor, organization of competition and financial and credit policy;

final checking of the quality of the produced product;

selection and training of personnel.

Decentralization of executive functions entrusted to the board of directors of individual plants is provided. Responsibility for implementation of production programs is borne by the board of directors of the plants.

At the same time all management functions of each plant are centralized in boards of directors of these plants, with the exception of line management by production subdivisions. There are generally no functional personnel in the production shops and moreover there are no workers responsible for repair of equipment, transport and warehousing of materials and articles and maintenance of production, office and service areas. A corresponding specialized shop is provided in each plant for these purposes.

Strategic functions on the part of the general board of directors are performed by specialized functional boards of directors--technical, for production, for economics and planning and commercial--according to the plan.

Simultaneously with development of the contract design, plant specialists work hand in hand with the designer services of Fiat on design of the first vehicle.

Those who have managed to evaluate Zhiguli automobile will find out that many suspension, steering, transmission and body parts were strengthened during finishing of the automobile compared to the Fiat-124, the design of the shock absorbers, gimbal drive and the guide elements of the rear suspension was changed. The disk brakes of the rear wheels were replaced by highly efficient drum brakes with aluminum drums and the hydraulic drive of the brakes was made separate on the front and rear brakes to enhance traffic safety. The great stability of the automobile in braking at high speeds was achieved by installation of a regulator that did not permit "fishtailing" in the hydraulic drive of the rear brakes. To increase traffickability, highway clearance was increased from 140 to 170 mm, the strength of the body was increased significantly, long durability of the joints of the front suspension and of the steering rods was achieved and a starter crank for the motor was introduced. Special attention was devoted to starting of the engine during tests. Reliable starting of it with a starter after the automobile had been parked for a long time at -25°C without use of any special measures was achieved. A carburator with horizontal flow of fuel and heating of the mixing chamber is employed on the automobile and a manual fuel feed lever was introduced. If one adds to this that the engine was fundamentally re-equipped, then the volume of serious changes introduced into the design of the first vehicle becomes obvious. The Fiat-124 was gradually transformed to the VAZ-2101, to a vehicle which the Italians called the "automobile for everyone" in conversations with Soviet specialists, for all latitudes and for all operating conditions.

One can say immediately that VAZ received the finished design of an automobile tested in operation. As we can see, this is far from true. Real creative cooperation occurred.

While the design was considered, until it was confirmed and while negotiations were under way on the course of fulfilling obligations, the Soviet technical delegation continued its work. Let us attempt at least briefly to illuminate the most important of the numerous aspects of its activity.

Simultaneously with participation in development of the contract design of the plant, our delegation together with Fiat specialists worked on issuance of initial data to the Soviet planning organizations. The Soviet specialists checked the documentation received from Fiat and issued their own conclusions on it to the Italian specialists. Only after coordinated corrections, changes and supplements were made were reports formulated for acceptance of the documentation and it was sent to Moscow.

One of the most important aspects of the activity of the Soviet technical delegation was conclusion of contracts for delivery of equipment. This was extremely crucial, laborious and complex work. Just like the sword of Damocles, the compressed deadlines of completing it hung over everyone. The most volumetric and prolonged work on the performance design of the plant depended directly on the deadlines for placing orders for equipment. After all, final plans for equipment, tasks to complete the detailed designs for footings under the equipment and drawings of the transport diagrams and local exhaust systems could not be fulfilled without knowledge of the parameters of the ordered equipment.

This work was arranged as follows schematically.

The technical assignments for ordering of each of more than 16,000 units of equipment were compiled jointly with Fiat specialists. The proposals of many, frequently competing companies for delivery of this equipment were then processed jointly; a coordinated agreement was supposed to be issued for each of the proposals and the agreement immediately assumed the form of prolonged engineering discussions that emerged to the highest level.

Finally, technical negotiations were conducted with the companies during discussion and agreement of the contracts.

The Soviet technical delegation developed and coordinated the typical requirements with Avtopromimport on those questions which should be reflected in the agreements for automatic lines, machine tools and installations, standard schemes of technical agreements, general requirements on the composition of the equipment and the technical documentation for it and the composition of appendices to the technical agreement. These standard instructions were a good guide for our specialists, who were forced to work in an unfamiliar and complex situation that also required slow and error-free decisions.

Preparation for production of the automobile, materials and make-up articles proceeded simultaneously. The Soviet technical delegation was supposed to receive from Fiat the technical characteristics of the materials used, the specifications for acceptance of these materials and the main specification of materials used in production of the automobiles. More than 90 percent of the materials and makeup articles proposed by Fiat for production of the Zhiguli automobiles went beyond the framework of our Soviet standards at that time. And after all the essence of the matter was not in purchase of materials but in development of Soviet analogs of these materials and make-up articles for mass production of automobiles.

Acceptance of the technical documentation for materials and make-up articles was organized by the same principle as acceptance of the technical documentation in general: Fiat--the Soviet delegation--Fiat--the Soviet delegation--Fiat--Moscow. But specimens of the materials were also supposed to have been received and sent to the USSR. Numerous questions, which were supposed to be answered in time with a knowledge of the production technology, specifications and methods of testing, were constantly sent to the technical delegation from the results of working with the specimens in the USSR. The specialists of different sectors of industry became at home in Turin. They needed technical and organizational assistance to familiarize themselves with production at the corresponding companies. Thus, the Soviet specialists became acquainted with production at more than 200 companies in make-up articles in 1967 alone. Groups of specialists, which were involved in questions of production of materials, were created in the Soviet technical delegation. They subsequently comprised the nucleus of the Department of New Materials of the Volga Motor Vehicle Plant.

Specialists of all related sectors of industry visited Italy. These were mostly workers of ministries, main administrations, scientific research institutes, directors, chief engineers and chief specialists of plants. Unfortunately, the second echelon of plant specialists--tool, equipment and nonstandard equipment technicians and designers--did not immediately follow this section of those on detached duty. As indicated by practice, the effect would have been more significant in this case.

In planning the plant at Togliatti, we knew that many deficiencies in the work of our factories and plants were related to gaps in organization and management of production rather than to equipment, technology and qualifications of workers and engineering personnel. Therefore, special attention was devoted to planning of organization of production, automatic information processing systems and production management.

Almost all managers of the functional administrations of the general board of directors were detached for prolonged periods to Turin to work on this part of the plan. They were then replaced by the deputy chiefs of these administrations. Significant groups of programmers and electronic technicians also arrived. According to the contract for design of the plant, Fiat was supposed to transfer materials on organization of production and on the automatic information processing system in three phases: the contract design for organization of production and automatic data processing in April of 1967 as part of the contract design of the plant; the first part of the performance design in August 1967 and the second part in December 1968.

Fiat representatives stated during discussion of the composition and content of the planning developments that, taking into account the complexity and laboriousness of completing the performance design of organization in the volume required by the Soviet technical delegation, Fiat was forced to recruit representatives of the equipment supply firms to the plant computer center and also Soviet specialists to perform this work.

The following division of labor was adopted. Fiat would develop the organizational structure, description of the functional interaction of subdivisions and determination and substantiation of the number of required personnel in close cooperation with plant specialists. The managers of the functional, economic, production, commercial and other services from the Volga Motor Vehicle Plant would participate in this work. The information processing procedures, document circulation using peripheral equipment and the use of computers would be described by specialists of the supplier companies in close cooperation and with constant consultation of plant specialists and under the control of Fiat, which bears responsibility for the design as a whole. The developed system will be introduced by plant specialists and Fiat with the participation of the supplier companies, which will perform patron installation, adjustment and starting of equipment.

Everyone related to working out the plan for organization of production and the automatic information processing system submitted their report as to how complicated and laborious this work is. But even they are unable to suggest how it will be in reality.

Work on the plan of organization of production proceeded according to deadlines within the limits of the planned schedules and continued for all of 1968 and the greater part of 1969. As a result only the basis was created for final finishing of a number of important sections of the plan of organiization of production such as the system of organization and payment of labor, material incentives of workers, engineering and technical personnel and salaried employees, technical and economic planning and internal cost accounting. These systems, which determine the economic organization of the plan, were worked out in practice and introduced by plant specialists in close cooperation with workers of the Ministry of the Automotive Industry, USSR Gosplan, USSR Ministry of Finances, USSR Goskomtrud [State Committee for Labor and Social Problems] and other organizations.

Wer received abundant planning material in the plan of organization of production and the automatic information processing system, which became a good basis for completing the full management technology of the plant in all spheres of its activity:

the structural diagram of plant management;

description of the functions of the main subdivisions;

the main procedures of document circulation;

information processing procedures in the computer center.

The types of peripheral equipment required to record preliminary information and the location of installation of this equipment were determined in the plan of organization of production and automatic information processing. Computers of the General Electric-Olivetti Company were selected as equipment for the computer center.

And yet another important aspect of the activity of the Soviet technical delegation in Turin must be mentioned, otherwise representation of it will be incomplete. We are talking about training the Soviet workers and engineering and technical personnel directly under Fiat production conditions. The knowledge that they acquired was not limited only to the framework of the coordinated programs. Our comrades received very much from direct and close contact with the workers, foremen and employees of the company. The spirit of cooperation among people immediately bore those results which could not be achieved on a purely official basis.

PHOTO CAPTIONS

1. p. 159. Minister of the USSR Automotive Industry A. M. Tarasov (on the left) and Honorable and President for Life of the Fiat Stockholders Professor Vittorio Valetta sign the "Protocol of negotiations between the Soviet delegation and the Fiat stockholders on cooperation in the field of developing a motor vehicle, design of a motor vehicle plant and its construction in the USSR (Milan, 4 May 1966).

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Planning the Plant

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 2, 82, pp 157-172

[Article by Boris Katsman]

[Text] Moscow

Numerous collectives of the leading planning institutes at Moscow created the future plant in drawings, the new housing region of the city, a complex of industrial, commercial and housing enterprises, institutions of culture, health and education and sports and other installations. An important apparatus--a branch of the general board of directors of the Volga Motor Vehicle Plant at Moscow--coordinated the efforts of Soviet and foreign planners and maintained constant ties with the general board of directors of the plant under construction. Fiat also maintained its permanent representatives at Moscow, who had direct telephone contact with Turin. Soviet planning organizations could receive an answer to practically any question that arose within 3-4 days. This guaranteed continuous development of the drawings and issue of them to the construction organizations.

As mentioned, issue of technical assignments for development of the construction detail plans was begun in 1966. It proceeded in parallel with development of the contract design.

There were four main phases of issue of technical assignments and accordingly four phases of development of the construction detail plans during design of the plant. The technical assignments for developing the drawings of footings were issued in the first phase. This made it possible as early as 1966 to begin to issue detail plans for construction of the buildings of the main works of the plant and to begin construction in January 1967.

The technical assignments and detail plans of the frames of structures of the main buildings were worked out during the second phase with regard to the production communications and hoisting-transport equipment. This made it possible to organize construction and installation work at the plant site, to recruit enterprises of the construction industry to manufacture reinforced concrete and assembled steel sections and in April 1967 to bein installation of columns for the main building by the time the contract design of the plant was completed.

Detail plans of the enclosing structures of buildings and the power building built into these structures were created during the third phase, which guaranteed that the buildings would be closed prior to winter and that heat would be delivered to them.

The technical assignments and detail plans of the fourth phase encompassed construction of the spaces within the shops, the underground facilities of the buildings and footings for equipment. This phase is characterized by considerable complexities since issue of technical assignments and development of detail plans from them were delayed by equipment orders. Therefore, the planners proceeded to issue plans with so-called "blank spaces," which were left for those types of equipment, characteristics and tie-ins were not received. Drawings of the floors were issued with the exception of those sections on which it was planned to install equipment requiring construction of footings or other underground installations and drawings of the roof were issued without indication of ventilation openings. The planners issued standard plans to the builders to install openings and to lay pipelines to them.

The method of joint planning and construction adopted during construction of the Volga Motor Vehicle Plant in itself provided a gigantic time advantaage. But the Soviet designers looked for and found reserves even in this progressive method. The close cooperation of the planners and builders and the spirit of innovation, which was generally inherent to the entire matter of construction of the automotive complex, contributed to this.

Working out an enormous number of detail plans within short deadlines was possible due to the new form introduced by Promstroyproyekt for making repeated decisions in the form of standard drawings of parts, articles and designs issued in albums. A series 3160, consisting of 76 issues encompassing all elements of the buildings--walls, floors, ceilings, partitions, window openings, doors, reinforced concrete articles, stairways, dividing walls and so on--was worked out for the Volga Motor Vehicle Plant. Only diagrams with references to drawings of series 3160 were issued in the designs of buildings and structures. According to approximate calculations, the use of these standard albums reduced the laboriousness of the detail plans by a factor of 1.5.

The separation of the general designer from the construction site began to be felt even more during organization of construction work. One representative of the general designer was not sufficient. Then in 1968, the duties of the general designer were entrusted to the planning administration of VAZ by an order of the Minister of the Automotive Industry.

Creation of a planning administration of VAZ designated a new approach to matters. The customer took on himself the entire responsibility for design of the plant and enterprises of the industrial and housing zone.

An important position belonged to the apparatus of the plant board of directors in Moscow. It consisted of several groups of specialists. The composition of these groups subsequently changed, but, if one may say so, branches of all the functional subdivisions of the general board of directors were in the Moscow apparatus at the considered phase. The capital construction group was involved in problems related to design of facilities of the plant, city and industrial housing zone and with planning and financing of construction. The equipment group was involved in coordination of the specifications and disposition of orders. The design group linked the administration of the chief designer of the motor vehicle plant to Moscow organizations involved in testing and finishing design of the automobiles. The workers' group, which represented the department of new materials, cooperated with the numerous ministries and agencies, with their sector institutes, with institutes of the USSR Academy of Sciences and with the technical delegation in Turin, achieving organization of production of new materials. The personnel group was involved at that time in continuous dispatch of specialists of the plant, ministries and agencies, planning and scientific research organizations abroad to participate in planning and preparation of production and also for training. They also received a numerous flow of visitors who wanted to visit the Volga Motor Vehicle Plant and answered letters.

Not only the plant but also the motor vehicle plant region of Togliatti was planned at Moscow. Seventeen scientific research and planning institutes of USSR and RSFSR Gosstroy, the State Committee on Civil Construction and Architecture, the Ministry of Housing and Municipal Services RSFSR, the USSR Ministry of Health, the Ministry of Education and other agencies worked by a general plan for issue of planning documentation.

Togliatti

The general board of directors of the plant under construction organized its activity here. Let us dwell on that aspect of this work which is related to coordination of planning, to guarantee of the construction site with a continuous flow of planning documentation, to the new forms of work and relations of the board of directors to designers, builders and installers which were found, which had a significant effect and which could be used in new large construction projects.

The rates of construction at Togliatti were increased so vigorously that so many large human and material resources were concentrated at the construction site that untimely delivery of even a small volume of planned documentation could cause idle times of thousands of people and a large number of high-performance equipment. If numerous branches of planning and scientific research organizations are added to the number of leading planning organizations involved in design of the complex (and they numbered approximately 40), then the total number is approximately 80. A tremendous amount of time would be spent on coordination with ordinary methods. Therefore, the planning organizations were temporarily subordinate to the customer--the boards of directors of the plant under construction. Authorization for this was received in the departments of construction and machine building of the CPSU Central Committee and at USSR Gosstroy, while the need for this step was recognized by the ministries and agencies themselves who were interested in most rapid construction of the complex. In no way giving up regimental honor, this procedure contributed to successful management of affairs.

During the first week of each month, the services of the board of directors and construction organizations prepared lists of debatable, unresolved and difficult to resolve problems related to planning and issue of technical documentation. These lists were sent to the planning institutes. Either solutions of these problems, suggestions for solution or postulations of the problems for board discussion and solution on the site with participation of the customer and construction organizations were prepared. Specialists of the administration of capital construction of the plant usually participated in this work.

The first supervisors or chief engineers of the planning organizations then left for a meeting at Togliatti with the general director of VAZ. Arrival at Togliatti included a compulsory inspection of the construction. The managers of planning organizations were convinced here on the site of the timeliness of the questions brought up for discussion. Therefore, everyone related to inspection of the construction site as other than an excursion.

Specialists of the board of directors met with the corresponding managers of the planning organizations at sectional meetings and prepared decisions which took on a final nature at a meeting with the general director. "Pending" questions of any kind were never left open after a meeting. The style of his management, not permitting long and fruitless discussions, incompetence and attempts to avoid a decision, also contributed to the extremely responsible nature of the meeting. The procedure of conducting the meetings was always established. The report of one of the construction supervisors on the work done during the month and about problems unresolved by the planning institutes that delay construction was given. The report of one of the managers of the board of directors on the course of planning and issue of technical documentation and also on unresolved technical problems was given. This was the managers of planning organizations listening to and making decisions on each item.

Implementation of the decisions of the meeting was monitored daily and unresolved questions were constantly in the view of the board of directors. An enormous list of questions was resolved during a two-day visit of the managers of planning institutes to Togliatti. This was possible due to the presence not only of managers of the board of directors and of the construction organizations but also of the directors of the structural steel manufacturing plants. Workers of party and Soviet organizations, including representatives of the corresponding departments of the CPSU Central Committee and the USSR Council of Ministers, usually participated in the work of the conference.

The time has now come to give the brief characteristics of planning technical and economic indicators. The struggle to achieve them determined the efforts of the entire collective over a period of many years.

The program given by the plan to produce 660,000 compact automobiles was supported by three production lines, each with a capacity of 220,000 automobiles annually on the main assembly conveyor. The plan provided for installation of more than 16,000 units of production equipment in the plant shops, of which 1,426 pieces were in the foundry—forging shops, 1,802 were in the press shop, 4,436 were in the mechanical assembly shop and 3,864 units were in the assembly-forging shop. A considerable part of the equipment--8,600 lines, machine tools and instruments--was supposed to be purchased abroad from more than 900 capitalist companies.

The planning decisions guaranteed a considerably higher level of labor productivity, product quality, all the main technical and economic indicators and significant improvement of working conditions than at other motor vehicle plants of the country.

The area of the production buildings per automobile comprised 3.3 m^2 compared to 2.8 m^2 according to the plan for reconstruction of the Moscow Motor Vehicle Plant imeni Lenin Komsomol; the areas of the warehouse buildings were 19.5 percent compared to 12 percent, the area of the service buildings was more than 160,000 m^2 compared to 100,000 according to USSR standards and the area of the dining halls and kitchens were increased more than threefold compared to the norm. The use of these norms made it possible to organize simultaneous feeding of an entire shift within 15-17 minutes and thus to reduce sharply losses of working time.

The high planned technical and economic indicators of plant operation also ensued from progressive technological and organizational solutions of the project. According to the plan, labor productivity comprised almost 10.5 vehicles per worker of industrial-production personnel annually, which exceeds almost 1.7-fold the productivity achieved at similar motor vehicle plants of the country. The labor consumption of the main model of the automobile comprised 70.5 hours according to the plan and was below that of the similar domestic Moskvich automobile by a factor of 1.5. It should be taken into account in this case that, as already mentioned, VAZ is a plant with a complete production cycle and the specific weight of large makeup articles and semifinished products at it is much less than at the AZLK [Moscow Motor Vehicle Plant imeni Lenin Komsomol]. If the plants are brought up to unified production completeness, the difference in the indicator will be even greater. According to the plan the cost is less by a factor of 1.3 than the cost of a similar product. The high level of the return of investment of labor, which is the ratio of the basic industrial production funds of the enterprise to the number of its industrial-production personnel, is typical, as it should be at a modern enterprise. This level comprises 24,500 rubles at VAZ and exceeds the average 1.8-fold throughout the sector. The structure of the industrial-production personnel also merits attention since it reflects the progressiveness of the production and organizational decisions adopted in the plan. The ratio of auxiliary and main workers was provided by the plan at the rate of 0.92 with an average indicator of 1.35 throughout motor vehicle plants of the country. The specific weight of engineering and technical personnel and salaried employees in the total numbers of industrial-production personnel comprises 14.5 percent in the country's motor vehicle construction. Decisions on transport warehouse operations, usually more laborious and less mechanized can be cited as an example of the progressive decisions adopted in the plan that affect the structure and generally the reduction of the number of workers. Mechanization of these operations is provided at the level of 98 percent in the plant design. If this level were the same as at other automotive plants, then VAZ would require three times more workers involved in transportation and warehousing of goods than according to the plan.

Part 2. Implementation

Implementation of the decree of the CPSU Central Committee and the USSR Council of Ministers on construction of the plant at Togliatti required a number of government documents. The Ministry of Transport Construction was entrusted with laying the external and internal railroads, external highways, river piers and structures and the Ministry of the Gas Industry was entrusted with construction of external and intraplant gas networks and structures, steel water lines and steel delivery sewers. The USSR Ministry of Communications was entrusted with planning and construction of external cable networks, automatic telephone exchanges, radio and television devices and equipment for postal and telegraph communications of the enterprises. Planning and installation and signalling of intraplant communications devices at the plant was given to the Ministry of the Radio Industry.

An enormous volume of work was entrusted to Minmontazhspetsstroy [Ministry of Construction and Special Installation Work]: manufacture and installation of assembled steel sections, installation of production equipment (except machine tool), electric installation and sanitation engineering work in the forge-casting and press shops and in the spare parts center. It was also entrusted with performing the ventilation, heat insulation, heat engineering and chemical protection work, installation of monitoring and measuring devices and automation systems and also construction of industrial pipes at all facilities.

The party and the government provided special measures for planning the material and technical supply that support uninterrupted operation of the construction project. Support of the plant construction with materials, equipment and all technical resources was planned individually within the system of USSR Gossnab. Enormous resources of high-performance equipment were expended on construction of the plant.

The volumes of construction required the corresponding financial resources and a special method of financing the construction project. The government authorized financing independent of the appropriations allocated for a given year but within the overall estimated cost of construction. This opened up a wide area for maneuvering, removed unnecessary barriers and made it possible to carry out construction in advance of the annual appropriations provided.

Parallel management of planning and construction on large scales--not only of the plan itself but of the central heating and electricity of VAZ and facilities of the construction base and construction industry--was related to specific unproductive expenditures which were later calculated. They comprised a sum somewhat exceeding 20 million rubles. But the advantage was calculated in billions received from sales of automobiles, which the plant produced as a result of acceleration of construction. Parallel management of installation, adjustment and starting of the industrial complex was authorized, which also yielded an enormous advantage in time and funds with insignficant delays.

The government authorized creation of a board of directors of the plant under construction until confirmation of the contract design for its construction and without regard to the established limits on its contert and accorded the board of directors a special status. It became possible to staff the body of the future board of directors of the existing enterprise within the board of directors of the complex under construction.

Government documents sanctioned the use of new norms that reflect the latest advances of worldwide practice, but that have not yet become operational in our construction. Attention was devoted in almost all documents to construction, reconstruction and development of supply enterprises of make-up articles, metal and materials. Moreover, special decrees of the government were adopted on these questions.

The American writer Arthur Haley compares motor vehicle production to an iceberg, the visible part of which consists of the automotive giants, while the invisible part of which consists of hundreds and thousands of large and small supplier companies. The visible part of an iceberg comprises one-seventh of its size. Construction of an automotive complex without the corresponding development of enterprises of related sectors could not be solved in any way in itself.

One could see the slogan: "Give the green light to VAZ freight!" during those years at many terminal stations of our country. The decisions of the party and government opened the way to innovator ideas, creativity of people, having afforded them important opportunities and great independence.

The decision on construction of the Volga Motor Vehicle Plant together with one of the largest automotive concerns of Europe was the beginning of the broad economic cooperation of the USSR with countries of the capitalist world.

Chapter 3. Management

The Builders

Everyone understood from the very beginning that it was impossible to manage this gigantic construction project by old methods. More than 60 large construction organizations were recruited for the construction. The equipment and structures for construction was delivered by 100 different enterprises of the country. The planning documentation was worked out by tens of planning and scientific research organizations of different ministries and agencies. More than 65,000 persons and thousands of machines and mechanisms were involved in construction during the period of the greatest scope. Construction of the motor vehicle complex exceeded construction of the Volga Hydroelectric Power Plant in the volume of work and construction of all seven machine building and chemical enterprises erected by the collected Kuybyshevgidrostroy during previous years in complexity. The requirements on the complexity of work and on the accuracy of performing it were extremely high. The organizations recruited to construct the complex did not know these requirements. The deadlines were also unprecedented. The plant was supposed to begin mass production of automobiles in 1970.

Fundamental rearrangement of the management system of organizations recruited for construction was required. In 1966, on the eve of construction of the motor vehicle plant, Kuybyshevgidrostroy together with its subcontract organizations performed the construction and installation work worth approximately 90 million rubles. Construction of motor vehicle plant required that this indicator be doubled in 1967 and more than tripled in 1968. The complexity and topical variety of work increased together with the volumes.

The idea of organizational rearrangement of Kuybyshevgidrostroy primarily included development of large administrations for construction of the trust type, each of which is capable of performing a large volume of work at sections given to it. Moreover, each of the administrations was specialized in specific types of construction and installation work or specific construction facilities. The administrations included a sufficient number of subdivisions--construction and construction-installation subdivisions, which were in turn specialized in production of specific operations or at specific facilities. The principle of specialization was also carried out in formation of sections.

The structure of general contractor--the administration of Kuybyshevgidrostroy, worked out during construction, was fully justified, having guaranteed competent management of the enormous construction project.

The Kuybyshev Branch of the Orgenergostroy Institute [All-Union Institute for the Planning of Electric Power Projects] worked out the network planning and management system of construction (SPU). Great hopes were placed on this system. However, unfortunately the SPU system did not become the predominant one at the construction project. The construction project was supposed to employ the most progressive methods of management using computer equipment. This was not achieved due to the weakness of the planning developments and due to the psychological lack of preparation of the personnel of construction subdivisions and their distrust of the system.

Although network planning and management were not used fully as a method of management of the construction project, an information system was created at it, by means of which the deadlines for performing jobs were monitored and problems for the near term were resolved. Operational information was compiled by the chiefs of sections and transferred to the SPU engineer of the construction administration. This information was reviewed and decisions directed toward correction of committed deviations from the schedule were made in a routine operational meeting conducted by the chief or chief engineer of the construction administration, where up to 70 percent of all problems that arose were resolved.

Information with the list of unresolved questions was transferred to the SPU group of the administration of construction, where summary information was compiled on the basis of analysis of the network schedules. The planned and predicted deadlines of construction, of the facility as a whole and of individual phases and also the work located at a critical juncture were indicated in it.

The summary information was reviewed at a routine operational meeting conducted by the chief engineer of the administration of construction with participation of representatives of the contract organizations and the board of directors of VAZ. Information about unresolved problems was then sent to the SPU department of Kuybyshevgidrostroy for consideration in the staff of the construction project, after which it was sent to the main administration of Glavzavodspetsstroy [Main Administration of Special Plant Construction], USSR Minenergo [Ministry of Power and Electrification] and to the SPU department of USSR Minmontazhspetsstroy.

The General Board of Directors and the Central Startup Committee

The special status of the board of directors consisted primarily in the fact that its composition was formulated on the basis of the total structure of administration of the future plant. Subdivisions directly related to construction of the plant and of the town--administration of capital construction of industrial buildings and structures, civil construction, equipment and so on--were naturally given preference. The staff of the general board of directors included the minimum required size of the board of directors of all works of the future plant and the board of directors for production in turn included cells of the main shops. In this case subdivisions and shops of auxiliary production, which became the first to go into operation, achieved accelerated development. The board of directors of the motor vehicle plant under construction was obligated to guarantee construction of the plant within the deadlines established by the government. This responsibility was entrusted for the first time to a board of directors of a plant under construction.

Coordination of the activity of the large construction and installation associations and also of tens of planning organizations and enterprises of the construction industry was an especially important matter. An interagency organization that had identical authority for all organizations participating in construction of the complex was required.

This organization, which was named the central starting committee or TsPK, included the general director of VAZ, the chief of Kuybyshevgidrostroy, the chief of the production and management administration of Minmontazhspetsstroy, the managers of construction organizations of the USSR Ministry of Transport Construction and the USSR Ministry of the Gas Industry, the directors of the works of the motor vehicle plant, the chiefs of adminstrations of Kuybyshevgidrostroy, the managers of the main subdivisions of Minmontazhspetsstroy, representatives of organizations and authors' inspection that inspect the construction, managers of the interested functional administrations and departments of the customer and contractors. The managers of the plant party organizations, Kuybvshevgidrostroy and Minmontazhspetsstroy participated directly in the work of the committee. Meetings of the committee were held with the participation of managements of party and Soviet organizations of the town and oblast, representatives of the CPSU Central Committee and the USSR Council of Ministers on the most important problems of the construction strategy.

Meetings of the TsPK were conducted regularly once per week on Tuesdays in the office of the general director. Like all regular meetings, the meeting of the TsPK was strictly regulated in time. Two hours were allocated to it. And these two hours were exceedingly full: how many important and complex problems were solved during them! Careful preparation and preliminary information of the meeting participants on all questions to be discussed contribute to the clearness and brevity of holding the meetings of the committee.

An operational group for analysis and verification of the course of construction of the complex, created in August of 1967, prepared materials for meetings of the TsPK and monitored execution of its decisions and information about unfulfilled decisions.

It included 20 specialists from the different production and engineering services of the board of directors without freeing them from their duties that they occupied according to the staff schedule. The duties of the group included development of proposals of an operational and future nature to eliminate any lag or causes which would lead to a lag of construction.

Before the arrival of official accounting data, the operational group, based on the data at its disposal and knowledge of the actual situation at the construction project, issued and dispatched monthly a summary bulleting to interested subdivisions on fulfillment of the construction plan for all indicators, supplied with thorough tables and graphs. An objective analysis of all the deficiencies and interruptions was given in the brief text of the bulletin, suggestions to correct them were formulated briefly and primary measures to improve organizational matters on the construction project were proposed. The value of the bulletin consisted not only in the operational nature of its publication (it was published literally on the second day after the end of the month), but also in the high degree of reliability of the information contained in it.

The duties of the analysis and monitoring group was also operational solution of problems of supporting the construction with estimate and technical documentation, equipment, make-up articles and materials and with detached duty of its workers to organizations and enterprises on which this support depended if this was required.

During the height of construction, each working day of all the managers of the board of directors began with a half-hour meeting with the general director, at which the manager of the operational group reported briefly on the status of affairs in construction during the past 24 hours. The managers of the services and subdivisions of the board of directors went away from these operational meetings with specific tasks to assist the construction and installation organizations and knowing well that an answer on fulfillment of these tasks must be provided tomorrow at the next operational meeting.

With the enormous number and complexity of facilities of the construction project, there was the threat of dispersion of forces of the construction and installation organizations. It could happen that facilities would be left unready for the final goal--production of automobiles--with successful fulfillment of the volumetric indicators of construction. Therefore, at the intiative of the general board of directors and with the unanimous approval of the central start-up committee, it was decided to determine the necessary minimum which was the condition for starting the first production chain, the so-called starting complex of the first unit. Capacities for production of 660,000 automobiles annually were determined by the priority of construction on three units with inclusion of each of the given production chain of facilities and lines only absolutely required for startup into the starting complex. All the remaining facilities, also vitally important for functioning of the plant and for bringing it up to design capacities, should be introduced after startup of the primary chains. Besides the three basic production units, there was also the so-called "zero" unit that included the complex of auxiliary shops and power supply facilities. This unit was supposed to be turned over for operation even before completion of construction of the facilities of the first unit of the plant.

Compilation of the first complex of the first unit was the most labor-consuming. The general board of directors of VAZ together with the management of Kuybyshevgidrostroy and Minmontazhspetsstroy and with the participation of the leading planning institutes of the country, worked out the principles of formation of each starting complex as the main direction of concentration of efforts, funds and attention. According to them, starting complexes were determined for each construction facility that comprised starting complexes of the corresponding units. They were reviewed and confirmed at the central startup committee and were sent to superior departments for confirmation. The summary starting complex of the first unit of the plant, designed to produce 220,000 automobiles annually, was compiled on the base of 132 starting complexes for each facility separately.

The most important decisions of the central startup committee were formulated by joint orders of the general director of the motor vehicle plant and the chief of Kuybyshevgidrostroy. They were specifically designated as chiefs of the starting complexes for each of the plant works and for each construction facility. Two chiefs and two deputy chiefs of the starting complex--one each from Kuybyshevgidrostroy and the plant--were usually designated. Startup committees, which carried out interagency coordination and management by facilities, were created at all the starting complexes. The startup committees included the first managers of subdivisions of Kuybyshevgidrostroy, installation organizations, motor vehicle plant works, representatives of inspecting organizations and inventors' inspection and manufacturing plants of reinforced concrete and assembled steel sections. Participation of representatives of inspecting organizations of the work of the startup committees made it possible to avoid a considerable amount of worthless work during construction. The startup committees became working committees on acceptance of the facility for operation by the time the facility was ready for construction and they then turned this facility over to a state committee. The responsibility of startup committees for a facility was thus indirect.

PHOTO CAPTIONS

1. p. 162. Panorama of VAZ construction project.

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Preliminary Work

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 3, 82 pp 195-210

[Article by Boris Katsman]

[Text] Party and Komsomol Work

Agency and interagency (regular and non-regular employees) staffs acted with the force of evidence, references to the contract design and directive deadlines of construction, with the force of orders, material and moral incentives and penalties and finally with the force of their own authority. The party and Komsomol staffs, of which there were many at the gigantic construction project, acted with their own methods, called upon mainly to touch the human heart and soul. It should be noted immediately that they had an enormous influence on successful implementation of construction and putting the planned parameters of the complex into operation and assimilating them.

The number of workers from Kuybyshevgidrostroy was supposed to increase from 17,000 in 1966 to 45,000 in 1968. The main subdivisions were supplemented with newly arrived people by three-fourths of the total staff. These were people from different krays and oblasts, of different ages and occupations, experienced and yesterday's students, bachelors and married people, men and women who decided by the call of their heart to participate in the All-Union construction project and these were those who came here in the hope of making "good money." Just to receive and house such an avalanche of people cost great efforts. But it was also necessary to assist them in manifesting themselves in the best manner.

Under conditions when the rates of construction work had to be increased from day to day, the main task of all party work became the struggle to fulfill the shift production tasks by each brigade and by each section. The party committee of Kuybyshevgidrostroy introduced a special institute of political organizers of brigades, which all communists without exception became. They saw to it that each builder was imbued with personal reponsibility for the fate of the construction project. The results of the work of sections were posted daily. The best brigade leaders were accorded the right to raise the flag of the construction project.

The party organizations put the quality of construction work under rigid checking. Party committees on quality, which included the best producer communists, were created in the construction administrations. They conducted educational work, monitored observance of the quality of work not only in their own but in adjacent subdivisions and created a situation of impatience with respect to any deviation from the requirements of the design.

Leninist Fridays were introduced in all the subdivisions of Kuybyshevgidrostroy. On this day all members of the party bureau of subdivisions go out to the construction facilities. They speak to the builders, explain their needs to them and are included in active assistance to brigade leaders and sections.

Meetings of construction, installation and motor vehicle plant organizations elect councils of communists on starting facilities of the construction project. They have an important influence on the course of construction and installation. Combined party meetings of organizations on burning problems of the construction project are held ever more frequently and with ever-greater results.

Uncoordinated organizations of the different trusts of Minmontazhspetsstroy were, as already mentioned above, administratively subordinate to the administration of the ministry for construction of the motor vehicle plant specially created at Togliatti. A unified party organization headed by the party committee of the administration was also created. This party committee knew how to combine the efforts of party organizations, of an entire detachment of communist installers within short deadlines and to take under control the fulfillment of planned volumetric and topical tasks of their own organizations, to organize jointly with the trade-union and Komsomol committees a competition in the subdivisions and to closely coordinate their work with the party organizations of Kuybyshevgidrostroy and VAZ.

The party committee of the plant was elected at the first conference in January 1969. From the very beginning it was given the right of a regional committee. This was required by the rapid growth of the collective, its party organization and its responsibility that increased from day to day for conducting an enormous volume of work. The plant party committee can now decide complex problems of the life of the collective independently, can organize on a proper level joint work and close cooperation with the party organizations of builders and installers and can significantly affect the course of construction of the complex.

The party committees of Kuybyshevgidrostroy, Minmontazhspetsstroy and VAZ worked in close cooperation.

The majority of the people arriving at the construction project as supplementary workers was young people. Therefore, the concern about them was one of the most important sections of party and political work.

In January 1967, the Central Committee of Komsomols announced the construction of the motor vehicle plant as an All-Union shock Komsomol construction project. In May 1968 a staff of the Central Committee of Komsomols was created here to coordinate the activities of Komsomol organizations participating in construction of the complex, to improve their work and to increase their effect on the course of construction.

A "Komsomol searchlight" has been created at the staff of the Central Committee of Komsomols. Its beams flare on 150 sections of the construction project. A journal of alarm signals was introduced at the staff. Immediate measures were taken on the most important alarm signals. The "Komsomol searchlight" illuminated problems that were not solved in time and that became "chronic." To analyze them, rating parties were organized with recruitment of a wide range of most active Komsomol workers. The data were analyzed and suggestions were sent to the management of the construction project. The course of the competition of Komsomol youth brigades, fulfillment of the Komsomol two-year plan, the results of relay races of glorious matters and acute criticism of everything that interfered with successful construction are far from the full range of concerns of the "Komsomol searchlight."

The staff of the Central Committee of Komsomols summarized the results of the socialist competition of Komsomol youth brigades, published "express telegrams" about them, which were hung in the most prominent places of the construction site.

Chapter 2. Support

Selection of the location for construction of the motor vehicle complex was not primarily determined by the presence of large construction organizations at Togliatti. At that time there was a large administration of construction and operation of production enterprises of Glavenergostroyprom [Main Administration of Establishments for the Manufacture of Structural Parts and Building Materials], USSR Ministry of Power and Electrification. Four large plants of reinforced concrete articles of this administration had at their disposal production capacities of 290,000 m^3 annually, while they produced 350,000 m^3 annually. A total of 6,000 persons worked at the enterprises of the administration.

There were deposits of construction limestones, sand and clay in the region of Togliatti. Cement, slate, brick, assembled steel sections, keramzit, asbestos cement and carpentry materials were produced here. It was clear that the existing base will be sufficient only for the first, initial period of the construction project. The maximum annual need for precast concrete for construction of the complex comprised approximately 600,000 m^3 according to calculations and the need for commercial concrete was approximately 900,000 m^3. This means that the capacities for manufacture of articles from precast concrete had to be increased more than twofold and that production of commercial concrete had to be increased more than 1.5-fold. The capabilities of the reinforced concrete articles plants in manufacture of parts and structures for large-panel housing construction had to be increased tenfold, that is, this production had to be essentially created anew. Existing quarries had to be considerably expanded and excavation of new deposits of limestone, sand and clay had to be begun.

It was decided to carry out fundamental reconstruction of the reinforced concrete articles plants, to construct a housing construction combine with capacity of 240,000 m^2 of housing area annually, and to support it with keramzit--to establish a keramzit plant with capacity of 250,000 m^3 annually. It was planned to construct the country's largest highly automated concrete plant with annual capacity of 550,000 m^3 of commercial concrete to meet the need for concrete.

A mosaic tile plant with capacity of 330,000 m^2 annually, a mortar plant with capacity of 140,000 m^3, a cement mold works with capacity of 180,000 m^2 of wooden framework annually, a base for material and technical supply, sets of equipment, assembled steel sections and precast concrete, a reinforcement works with productivity of 19,400 tons of structures annually, a base of installation organizations and civil construction, a motor pool of Kuybyshevgidrostroy and a board of directors of VAZ, a mechanization base, temporary towns for disposition of construction and installation administrations, temporary housing settlements for the builders and installers and temporary dining halls, railroads and highways to the construction site--this is far from a complete list of the facilities which had to be constructed.

It was decided to produce galvanized shaped steel flooring at the Kuybyshev Plant Elektroshchit, USSR Minenergo, with regard to the use of completely new structural designs. To do this, a shaping-bending mill with annual productivity of 2.3 million m^2 (with two-shift operation) was purchased from the French Comec Company. It was planned to organize production of special glazed window sashes with high-quality painting on a production flow line of Soviet manufacture at this same plant. The productivity of the line is approximately 10,000 sashes annually.

It was planned to equip shops at the Volgograd, Leningrad and Serov energolesokombinats [mechanized lumber-sawmill combines] to produce a special end charge never before used in Soviet construction. To meet the needs of the construction project for carpenters' articles, the Morkvashin Woodworking Combine, located near Togliatti on the opposite bank of the Volga river, needed fundamental reconstruction and considerable expansion.

More than 140 million rubles of capital investments, including more than 30 million rubles for the complex of the Volga Motor Vehicle Plant, was provided to develop the facilities. The motor vehicle plant was supposed to begin mass production of automobiles within three or more years. This means that allocation should be made in no more than two years for construction of the construction base, its first unit was supposed to be introduced in the first year of construction, while the main facilities were to be turned over during the first year.

The construction base of the automotive complex was developed within two years. This made it possible by the moment the first unit of the plant was turned over for operation to assimilate 74 percent of the total cost of construction and installation work (69 percent according to the main industrial facilities of the complex and 95 percent according to the external engineering systems and structures).

By the time the first unit of the motor vehicle plant was put into operation, approximately three million m^3 of site-cast concrete and reinforced concrete had to be laid. The lion's share of the volume of work was allocated for 1968-1969. It is natural that the problem of accelerating the construction of the large concrete plant was brought to the forefront during the first weeks of construction: without it, we could not talk about organization of a continuous concrete conveyor.

Construction of the plant was begun in the early spring of 1967 and during the summer the construction project literally suffocated due to a shortage of concrete. And the plant was put into operation within an unprecedented short deadline, by 10 September 1967. This was an event of extreme importance and they were glad of such an enormous achievement at the construction project.

And suddenly the plant stopped on 15 December. Insufficient organization in the work of various subdivisions of Kuybyshevgidrostroy, lack of support of the plant with commercial steam for working under winter conditions and, which is especially unacceptable, serious deficiencies in the design of the plant developed by the Kiev Institute Giprostrommashina were revealed. Reconstruction of a plant just put into operation took a month away from the intensive labor of the entire collective.

Construction of the Bol'shoy Concrete Plant clearly showed that we must struggle with annoying disorders that are counter to the selfless labor of people when heroism and self-sacrifice of some is overlapped by lack of organization, negligence and idleness of others.

The material and technical supply of the construction project under conditions of high industrialization of construction, when articles of increased plant readiness were supposed to be delivered to the site, rather than simply materials (although the nomenclature of the latter was also enormous), became an engineering problem. It required well-thought-out organization, its own technology, dispatcherization and clarity. That is why they got the idea at Kuybyshevgidrostroy of the need for organizational and so-called technological restructuring of the material and technical supply.

Administrations of production engineering makeup (UPTK) were created at the administration of construction, instead of the ordinary offices and departments, while retaining the large administration of material and technical supply with developed system of warehouses, bases, sites, access tracks and transport equipment within Kuybyshevgidrostroy. The regulations on the administrations envisioned that they were supposed to guarantee "an increase of the supply process during the universal process of engineering makeup."

The first time the UPTK was left with a makeup base of only precast concrete and this function was not fulfilled clearly. Due to haphazard storage, the construction project frequently experienced a shortage of structures avilable at the base. Staffing with qualified engineering personnel was drawn out. The specialists which were sent to work at UPTK did not want to go there and those who went soon began to complain about their own consent, because they were transformed to expediters and "pushers of an internal scale." The matter was not organized in an engineering manner: there were no makeup agencies, charts and diagrams for storage of parts and structures, and the production process of makeup and a clear system of orders from customers were not present.

The main success could become only breaking of the usual concepts of the work of these subdivisions and sending better engineering personnel here who were capable organizers. And this problem was solved in the end.

Despite the serious difficulties caused by using the parallel design and construction method, when specification of funds and compilation of material orders had to be made in the absence of certain parts of technical documentation, despite the fact that the warehouse facilities of Kuybyshevgidrostroy did not fully meet the needs of the construction project, support of the construction project with material resources was mainly satisfactory.

The volume of freight delivered to the construction project during 1967-1970 alone was an enormous avalanche of almost 11.5 million tons. Of this, more than 80 percent went to the construction sites directly from the delivery vehicles, changing the bases of the administration of material and technical supply. This is also true of the thrifty, businesslike approach of the rear guard to solution of construction problems.

Chapter 3. The Construction Project

The gigantic construction project extended for almost 70 km from the watergate through the construction site, industrial-housing zone and new rayon of the city to the remote water-sewer discharge.

The main thing was its own at each phase of construction. The end of 1966 was survey work and construction of access tracks to the construction project; 1967 was accelerated construction of support facilities and the broad scope of excavation work; 1968 was a time of concrete and installation of the frameworks of buildings; 1969 was enclosing the buildings and delivery of heat to them; and 1970 was installation of equipment and the beginning of mass production of automobiles.

Up to 65,000 persons worked here during peak periods. Up to one million rubles per day were assimilated by the builders and installers at the height of construction. More than 2,000 large-capacity trucks, approximately 200 large bulldozers, more than 200 excavators, more than 400 construction cranes and hundreds of other machines and mechanisms were concentrated on the construction project during the busiest days.

Millions of cubic meters of earth, site-cast and precast concrete, hundreds of thousands of tons of assembled steel sections, millions of square meters of floors and roofing and many thousand units of the most complex installed and established equipment on the one hand, but there is another aspect of the matter and it is the main thing: the workers--drivers, machine operators, concrete layers, stone masons, carpenters, installers and adjusters labored not so much in numbers as with skill. Construction of the automotive complex at Togliatti provides an innumerable set of examples when workers went to the construction project not as simple executors of someone's will, but as creators, innovators and ture masters of the matter.

The Participants

During the hot August of 1966, the surveyors were the first to appear at the construction site. A small group of these explorers of the construction site--a total of only eight persons--had as their task to make the first reconnaisance and to prepare the broad front of work for the large brigades from Kuybyshev, Saratov, Volgograd, Penza and Ufa. Branches of the Kuybyshev Trust of Engineering Construction Surveys, recruited for accelerated management of work, were located in these cities.

Need one say that the deadlines allocated for conducting topographic-geodetic and engineering-geological work were extremely compressed? On 25 August 1966 the trust received the technical assignment of Giproavtoprom to conduct the surveys and by the middle of September the results of these surveys were already supposed to be presented to the general designer. The design work could not be organized without this either in Turin or in the Soviet planning organizations.

A total of 28 survey brigades was sent out immediately to conduct the field operations on the site. But the main thing here was that the people who were entrusted with conducting the work--engineers, technicians and workers--looked for ways to compress time. It was they who gave the high tempos to the construction project.

Despite the compressed deadlines, the geodesists made the survey on a scale of 1:500, that is, immediately for the stage of the contract design, although one could get along with a scale of 1:1,000 or even 1:2,000 for the phase of the contract design.

The first phase of survey work on the site of the motor vehicle plant was completed on 12 September 1966. The engineering and geodetic conclusions and compies of the topographic plans were sent by airplane to Moscow.

Excavation work with a total volume of 114 million m^3, of which 72 million comprised excavation of earth and 42 million comprised fill, was performed on construction of the complex during the period from 1966 and up to the moment the first unit of the plant was put into operation; 33 percent of the total volume of excavation work was performed under winter conditions.

This volume of work could be performed only with the assistance of high-performance machines and mechanisms and this equipment had to be available by the most efficient method. The managers of the construction project and engineers were involved in a search for it and driver Ivan Viktorovich Remigaylo found it.

"It can be shown to someone," said I. V. Remigaylo at that time, "that the labor productivity of the drivers working on hauling the soil depends only on speed. Just press on the entire piece of iron and there will be more trips. No, you don't achieve this by speed in one run. Very much depends on the work of the excavator as well. There must be smoothness of operation of all participants of work and to do this, the drivers and excavator operators must be combined into unified subdivisions."

Two complex brigades--ours and Bykov's--were created in April 1967. A month passed, the results were totalled and we were glad: our brigade had hauled 45,000 cubic meters of soil--121 percent of the monthly plan. The idle times of dump trucks and excavators were reduced to a minimum in the complex brigade. Each of our members was interested in the results of work and in their own collective work. Therefore, everyone was looking for reserves."

"The excavator in the pit could be arranged differently: and so that the boom made a rotation of 180-200° and by 100-120 when loading soil into the dump truck. We save only one second in one cycle in rotation of the boom. But four seconds are saved when loading the truck and this adds up to approximately 1,000 seconds per shift. During this time one can fill eight dump trucks and haul an additional 32 cubic meters of soil. And during a month with two-shift operation one can haul 1,500 cubic meters."

Approximately 25 percent of the volume of excavation work had been completed in July 1967 through the efforts of 13 complex brigades. The method proposed by Hero of Socialist Labor I. V. Remigaylo subsequently found application in solution of other problems--in concrete work, completing the construction with precast concrete, installation and adjustment of equipment.

A total of 2.9 million m^3 of site--cast concrete and reinforced concrete was laid in the building of the complex during 1966-1970. If this concrete had been loaded into dump trucks, the distance from the head to the tail of the formed column would be seven times greater than that from Moscow to Vladivostok. A total of 24 percent of site-cast and reinforced concrete was laid at the construction project in winter.

The first steps of the concrete conveyor were especially difficult because the Bol'shoy Concrete Plant had not yet organized its own work. The dump trucks hauled concrete from remote plants and it froze en route in winter. Intensive methods of heating had to be found. Different methods were employed. For example, turbojet engines brought in by pilots were brought in--they were used to remove ice and snow and to heat the concrete in the tanks. Freeze-proof additives of chemical salts, heating the concrete in the bodies of the dump trucks with electrode installations manufactured for the first time at the 14th Construction Administration of Avtozavodstroy, were also employed. Stock heating forms were also used extensively.

All this required enormous scales so as to guarantee gigantic volumes of continuous concrete laying. Only at the bottom of the "glass" of the watergate where 420 tons of reinforcement were laid, was it necessary to pour 3,600 m^3 of concrete per minute in a continuous flow during a period of two days!

Initially 2,500 m^3 of concrete and later 3,500, 4,000 and then even 4,500 m^3 of concrete had to be laid daily during the time of the "great concrete" pouring. And in order to lay it, the reinforcement had to be installed, set and then, after laying, remove the forms after the time established by the technology. And it had to be tamped, tamped and tamped.

A real competition of the brigades was organized at the construction project. The winning brigade was accorded the high honor of raising the flag of the construction project. The brigades involved in laying concrete did this many times.

The trusts and administrations also competed with each other. The brigades competed. The administration of construction of Avtozavodstroy competed with the Magnitostroy Trust, the brigade of Vladimir Olekseyenko from the 11th Construction Administration of Avtozavodstroy competed with the brigade of Petr Kuz'min from Magnitostroy. The 12th Construction Administration of Avtozavodstroy competed with the administration of the Prokatpromstroy of Kazakhstan Magnitka and the complex brigade of Nikolay Trofimovich Zenkov, now a Hero of Socialist Labor, competed with the brigades of Roman Truskovetskiy and Vitaliy Stepanenko from Prokatpromstroy.

The competition between the construction trusts, administrations and brigades became a precursor of the competition among the producers, shops and sections of the motor vehicle plant, and the plants, shops and sections that supplied metal, plastics and makeup articles to VAZ.

Tactics and Strategy

The "great concrete laying" in construction of VAZ gained force. Complex brigades of concrete layers provided the front of operations for installation of precast concrete and assembled steel sections. A new task came to the forefront for the construction project--to install the framework, to enclose the boxes of the gigantic buildings and to provide heat to them.

It was necessary to install almost 1,750,000 m^3 of precast concrete and 270,000 tons of assembled steel sections and to lay more than 2.3 million m^2 of roof on the buildings. More than 45 percent of the work had to be done in winter.

More than half of the total amount of site-cast and reinforced concrete laid in the buildings of the plant were laid in closed buildings: the footings for the equipment, basements, tunnels and "rough" floors. The characteristic feature of the construction project was to lay concrete in a production sequence of initially concreting the footings for the framework of the building, then, after the building had been enclosed with walls, a roof and heat had been delivered to it, all the remaining elements were concreted. This permitted a considerable reduction of the construction deadlines and to perform a large volume of very laborious and complex concrete work in closed buildings regardless of weather conditions.

In August 1968 the construction project was to assimilate 756,000 rubles of construction and installation work per day. But this was still little. To enclose the buildings and to provide heat to them prior to the onset of winter, the rates of basic operations had to be essentially doubled in September. Alas, this did not occur either in September, in October, or in the subsequent months of 1968. Solution of the main task of 1968--putting the facilities of the zero unit into operation and enclosing the framework of the buildings of the first unit with delivery of heat to them--was postponed to 1969, while turnover of the first unit of the motor vehicle complex for operation at the end of 1969 was inevitably shifted to 1970.

The deadline for putting the first unit of the motor vehicle complex into operation at the end of 1969 was fixed in a number of documents, including international documents. Moreover, the first unit was turned over for starting-adjusting work in April 1970. Serial production of automobiles was begun in August of the same year and by the time the first unit was officially turned over for operation on 24 March 1971, 50,000 automobiles had been produced. Thus, the lag from the deadline indicated above comprised from 8 months to a year.

Let us leave aside the question of whether one can generally talk about a lag if the plant began serial production of products essentially within 3½ years after the beginning of such extensive construction. The deadline existed, one could not get around it, and this requires explanations.

The deadline about which we are talking was first designated in 1966 during negotiations with Fiat about cooperation in development of the plant. This deadline followed from the evaluation made by both Italian and Soviet specialists. And although construction of such an enormous motor vehicle complex had no precedents in the practice of the proponents, nevertheless a specific deadline could not be called unrealistic by the proponents. However, the general board of directors of the plant under construction proposed that the completion of construction be included in the starting complex of the first unit for practically all the main production buildings of the plant, under the roofs of which all three units were supposed to be located, during development of the starting complex of the first unit. Only several buildings without which organization of mass production of automobiles on the first production line was completely possible were left outside the starting complex.

The starting complex of the first unit included production facilities with an area of approximately 1.7 million m^2 and auxiliary facilities with an area of 28,000 m^2. The first unit was supposed to include construction of 75 percent of the organized area of plant buildings. It was planned to install 55 percent of the total amount of production equipment in the starting complex of the first unit. The service and office buildings, dining halls and dispensaries were included in the complex in volumes required to guarantee 50 percent of the total population of plant workers provided by the design.

Moreover, turnover of the capacities of the first unit for operation according to permanent planned process flow diagrams rather than temporary diagrams was envisioned for the starting complex. The "spots" of each of three units were clearly defined in fully constructed buildings. The efforts of the builders, installers and motor vehicle builders were concentrated initially on filling in the "spots" of the first unit. The second and third units were arranged in closed heated buildings during operation of the first unit.

Thus, the first unit of the plant was not at all one-third of the plant in the form as it was defined by the starting complex. And of course, this decision required considerably expansion of the work front and resulted in extension of the deadlines for putting the first unit into operation compared to the initial deadlines. But this solution, somewhat extending the period of putting the first unit into operation, reduced considerably the overall deadlines for putting the entire complex into operation. The deadlines for assimilating the capacities of the first and of the two subsequent production lines were reduced considerably in the completely finished buildings and with the production equipment of the first unit installed in complete accord with the plan. The total expenditures of funds were reduced since temporary technology did not subsequently have to be refinished to planned to technology.

These concepts should be kept in mind when evaluating the results of the work during 1968 and 1969.

The year 1968 did not become the year of completing the construction of the main production buildings and delivery of heat to them. The year 1968--the year of the "great concrete laying"--can also be called a year of intensive installation of the framework of the plant buildings. Construction of site-cast footings of the production buildings had mainly been completed and assembly of their framework had been completed by the spring of that year. The builders campaigned in the name of heat in 1969. This task occupied practically all their time and efforts throughout the greater part of the year.

PHOTO CAPTIONS

1. p. 208. The Volga Motor Vehicle Plant was the country's first to take itself on a mass scale a significant part of servicing of Zhiguli automobiles during their operation. In the photo: in one of the automotive centers of VAZ.

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Plant Construction

Novosibirsk EKONOMIKA I ORGANIZATSIYA PROMYSHLENNOGO PROIZVODSTVA in Russian No 4, 82 pp 145-158

[Article by Boris Katsman]

[Text] "We Build VAZ While VAZ Builds Us"

The operations related to enclosing the buildings, with delivery of heat to them, far from exhausted the entire volume of construction and installation work. Construction of the footings for equipment, basements, intrabuilding channels, concrete preparation of floors and laying the concrete occupied an important position. The construction organizations were unable to recruit their own forces for this work.

The general board of directors of the plant under construction adopted a uniquely correct decision under these conditions: the entire part of the growing operational personnel which could be freed from work on preparation of future production would from day to day be directed toward preparation of the areas for installation of equipment and for construction of housing and cultural and service facilities. Fitters, electricians, machine tool operators, welders, salaried employees and engineers became concrete layers, stone masons, carpenters, finishers and auxiliary workers. The managers of the production subdivisions were forced during this period to switch main attention to organization of these types of jobs.

Of course, it would have been more correct, judging by the recruitment, to use the plant workers and engineers by their primary designation, but it was put off due to the lack of preparation of the fronts for installation of equipment and due to the acute shortage of housing. It was more feasible through common efforts to bring the time closer when they would be occupied with their own direct matters than to wait until this occurred without their participation.

There was yet another, we feel, very significant aspect of this matter. Construction and later installation seemed to complete a cycle begun by the participation of engineers and operational workers in design of the plant and selection and ordering of equipment.

The people themselves--workers, engineers, and managers--did not at all regard the participation in construction work as delays like something forced on them. On the contrary, they often emphasized the usefulness of direct participation in development of the plant and city where they were to work and live. "We are building VAZ, while VAZ builds us," young engineer of the mechanical assembly works, graduate of the Kuybyshev Polytechnical Institute Vladimir Isakov wrote in 1969.

During 1969 the motor vehicle plant workers remained the basis of the force in construction of footings, ducts and tunnels, basements and "rough" floors in the main building. The new region of the town also became a warm section. The volumes of construction work increased much more rapidly than the plant collective. Preparation of the areas for the installation and the installation itself attracted an ever-greater number of people. The machine tools and units of the "zero" unit became operational, which also required people. The acuteness of the situation in housing construction was intensified. And then thousands of enthusiasts, which were called "three o'clock workers," those who went to construction of the growing apartment houses after a hard work day, then appeared in the VAZ collective.

The government recruited a number of construction organizations from Moscow, Leningrad, Kiev and other cities to assist Togliatti. The aid was both timely and significant, especially due to the advanced methods used by the builders of Glavmosstroy [Main Administration for Housing and Civil Engineering Construction in Moscow City].

The "Zero" Unit

Achievements and victories increased among everyday concerns and holidays arrived. There were many of these holidays: the first installed machine tool, the first part produced on this machine tool and delivery of heat to the building. People soon became accustomed to them. But in the middle of 1969 the first important holiday occurred on the construction site--the first fully completed and operating shop of the plant became operational on 1 July. This was one of the smallest shops--the repair-forge shop. But, as they say, little bodies may have great souls. The shop products acutely needed working machine tools for the building of auxiliary shops. And the main thing--this was the first of the completely finished facilities of the plant.

Mobile command posts of managers of different ranks appeared at all the warm sections. The KP [command post] of the general director of VAZ V. N. Polyakov was located in the building of auxiliary shops in the winter of 1968-1968. The auxiliary shop building began to produce its first products on 16 December 1968, one year exactly prior to official acceptance of it for industrial operation. It remained during this year to install and debug more than 2,000 machine tools, units and installations and to complete construction work in the service areas and to finish the building. This was done in parallel to the ever-increasing output of products. The first state plan for output of products was released for July 1969 and the auxiliary shop building was accepted for industrial operation with a mark of "excellent" on 30 December 1969.

Primary introduction of the buildings of the so-called "zero" unit into operation was part of the overall strategy that permitted during the height of construction and installation to organize manufacture of nonstandard equipment of accessories, suspensions for conveyors and a number of other mechanisms and articles which the construction project needed on the plant territory. And also in quantities in which it could not be organized at any other enterprise.

Shops for manufacture of dies for cold and hot forging and models for the foundries could be temporarily located on the enormous areas of the auxiliary shop building and manufacture of accessories required to organize main production could be begun on their capacities. The first set of dies and the metallurgical equipment and also cutting tools for 1,000 hours of equipment operation was ordered together with the equipment. But they were supposed to be kept in reserve. The beginning of operation was oriented toward the use of their own tools and their own production equipment in which changes had to be introduced in adjustment of the equipment. Previously prepared capacities of the tool shops of all works were also required for this. This problem was also solved by primary introduction of shops of the "zero" unit.

It was also decided to locate the shops and laboratories of the administration of the chief designer and the administration of laboratory research work and to organize in them the research and experimental work on automobiles, materials and makeup articles required during intensive preparation for startup of main production on areas of the auxiliary shops of the "zero" unit. And finally, without waiting for putting the plant's training center into operation, a shop of the technical training department was created where operators and adjustors underwent intensive practice for main production.

At first glance the primary introduction of auxiliary facilities may postpone the deadlines for introduction of facilities designed to produce the main product for which this plant is being constructed. It must be confessed that this approach is rather widespread in construction of industrial facilities. And colossi grow on clay feet, devoid of a material base for subsequent development. Fortunately, this did not happen at VAZ

The Most Active Members of Party and Economic Organizations

Reporting to the Central Committee of the party on the status of construction of the motor vehicle complex, V. N. Polyakov noted that more than 760 million rubles of capital investments or almost 35 percent of the estimated cost of the complex had been assimilated by 1 January 1970 in construction. Almost 63 percent of the total cost of construction and installation work had been assimilated in industrial construction. Basic funds with a cost of 233.5 million rubles, including the repair and forging shop with capacity of 5,000 tons of forgings and 800 tons of stampings annually, the auxiliary shop building with organized area of 134,000 m^2, 70 km of highways and 20 km of railroads, more than 400 km of pipeline and sewer networks and different structures of power engineering and the construction base, have been assimilated. A total of 213,000 m^2 of housing area had been introduced. Construction of a bakery and meat packing plant and creamery was begun.

The general director included the low level of readiness of the areas for installation of equipment among the number of most important unresolved problems of 1969. Only 222,000 m^2 of areas of the planned 838,000 had been prepared for the first unit. Installation of the framework of 18 auxiliary buildings of the first unit with total area of 120,000 m^2 had not been completed in 1969 and construction of the roads within the site, a number of water and energy supply structures and part of the service buildings in the insets of the main buildings had not been completed. It was necessary to accelerate finishing of all this during the first two months of 1970.

The report of the general director contains suggestions on the deadlines for completion of construction and installation work of the starting complex, tied to the tasks on automobile production established in the state plan for 1970. "The state plan for 1970," it says in the report, "provides for output of 27,500 automobiles. This task can be solved if output of automobiles begins no later than July with an increase of rates within maximum compressed deadlines: 600 units in July, 1,500 units in August, 2,600 units in September, 5,000 units in October, 7,800 units in November and 10,000 units in December. The daily output by the end of the year should thus comprise approximately 400 automobiles."

The deadlines for completion of the work now determined the state plan on automobile production. It was suggested in the general director's report that the plans for subsidiary construction installation work and capital investments as a whole for 1970 be increased significantly, having established the volume of work for the first six months on the scale of the remainder of uncompleted work on the starting complex of the first unit. A significant position was given to housing and cultural and service construction, the lag of which delayed staffing of the plant with personnel.

A meeting of the most active party and economic organizations was held on 11 February 1970 in the House of Culture imeni Leningrad Komsomol. It is difficult to over-evaluate its significance. This was a real war council prior to a decisive phase of a battle.

The deputy minister of the USSR automotive industry, general director of the motor vehicle plant V. N. Polyakov, the chief of Kuybyshevgidrostory N. F. Semizorov and the chief of administration of Minmontazhspetsstroy G. D. Troitskiy gave reports at the meeting of the most active members. Thorough analysis of the proposed measures to complete construction and startup of production was given in the speeches of the secretary of the oblast party committee V. N. Orlov, the minister of the USSR Automotive Industry A. M. Tarasov, the deputy minister of USSR Power Engineering and Electrification A. P. Aleksandrov, the deputy minister of USSR Transport Construction N. I. Litvin and the head of the machine building department of the CPSU Central Committee V. S. Frolov.

There is no need to outline everything that was discussed by the reporters and speakers. Let us present only an excerpt from the "Attitudes of participants of the meeting of most active members of party and economic organizations toward workers, engineering and technical personnel and salaried employees--participants in construction of the Volga Motor Vehicle Plant":

"The construction project has entered the final phase--the phase of preparing a broad front for installation of production equipment."

"To complete the established building for putting the first unit of the motor vehicle plant into operation and to produce 27,500 automobiles in 1970, the collectives of builders, installers and operators must complete construction and installation work, installation of equipment and turn over the facilities of the first unit of the motor vehicle plant for starting and adjusting operations within the following deadlines:

large press, welding and body painting shops in February;

medium and small press shops in March;

main conveyor in April;

original parts zone in chassis shops in May;

aluminum casting, forging, galvanic coating, reinforcement-radiator shops, complex of motor and chassis shops and wheel and automatic lathe shops in June;

cast iron foundry and thermal division in July.

The remaining buildings should be turned over within the established directive deadlines.

One of the most important conditions for completing the established tasks on output of automobiles is to support the plant with cadres of motor vehicle builders. Housing is required for their reception and disposition. Therefore, one of the primary tasks of the builders and installers is accelerated introduction of apartment buildings and facilities of cultural-service designation into operation. Apartment buildings with a total area of 300,000 m^3, four schools, six children's combines, three social-trade centers and a number of other facilities must be constructed and put into operation in the new rayon of the town this year."

"Completion of daily, weekly and monthly plans by each subdivision should become the law of the construction project."

The benchmarks of the labor path--a great deal of earth and a great deal of concrete, the vigorous time of staffing and establishing the enormous collective of builders and installers and complex problems of management of construction--remained behind. The growing buildings of the motor vehicle plant became a reward.

"Having visited the motor vehicle plant at Togliatti on foreign trade matters," writes N. N. Smolyakov in his book "With What Does the Motherland Begin," "I turned attention to the high quality of construction and installation of equipment and the careful finishing of buildings, roads and passages. The usual unfinished areas for this type of construction, traces of the remains of materials, the elements of a building and so on were absent here. You walk through this plant and your heart is gladdened. This enterprise inspires man and gives him strength. You think about the people who created all this and you are unwillingly inspired with respect for them for their excellent labor."

The heated buildings supplied with electric power, gas and water waited for the installers. Installation becomes the battlefront.

Chapter 4. Delivery of Equipment

The geography of deliveries was determined in compilation of the so-called distributing agency for equipment, which was refined as the capabilities of Soviet and foreign equipment manufacturing enterprises were determined, during contract design and technical and commercial negotiations of the Soviet delegation with different foreign companies. The characteristics of the equipment and the deadlines for delivery of it were carefully tied to the capabilities of the Soviet enterprises and the enterprises of CEMA countries.

It was decided to purchase approximately 50 percent of the 16,576 units of production equipment in the USSR and in socialist countries. This comprised approximately 35 percent of the cost of all deliveries. Approximately 900 large, medium and very small capitalist companies, more than 500 enterprises of our country and tens of socialist plants developed the equipment for VAZ. More than 350 suppliers were in Italy, 225 in West Germany, 90 were in the United States, approximately 80 were in England, more than 50 were in Switzerland and approximately 30 were in France.

Equipment with a total weight of approximately 800,000 tons had to be transferred to Togliatti. Of this, up to 500,000 tons was for equipment of the first unit, 200,000 tons was for equipment of the second unit and 100,000 tons was for equipment of the third unit. The zero and first units contained 9,738 units. This is approximately three million freight spaces or simply speaking, crates of different dimensions, packed according to the requirements of maritime transport. The ever enormous avalanche of equipment was supposed to arrive at Togliatti within a precisely determined deadline, in complete sets and in complete preservation.

The bases of organizing the deliveries also included selection and ordering of equipment. Organization of matters was perfected and the system acquired ever-greater clarity and completion during acceptance, dispatching, transport, unloading and disposition and transfer of equipment for installation.

We attempted to obtain the best and leading equipment from worldwide machine tool building, but the "different breeds" threatened losses of standardization of the most important equipment assemblies. This could result in serious difficulties during operation, maintenance and repair. That is why at the beginning of 1967 special unified specifications were worked out that predetermine the main design features of purchased equipment, the most important of its components and specifically those systems such as hydraulics, pneumatics, electronics and electrical items. Their observance was compulsory for all equipment suppliers, regardless of the country in which they were located. Delivery in complete sets with equipment of fast-wearing spare parts for 10,000 hours of operation and a complete set of cutting tools for 1,000 hours of operation was obligatory.

All the equipment was supposed to be accepted by the customer on the site in a working condition. An unalterable condition of acceptance was guarantee of the given parameters of machining precision and productivity. Primary importance was given to acceptance.

Acceptance of equipment at Turin was one of the basic directions of the work of our technical delegation. The equipment was accepted not so much in finished form as during the process of its manufacture. Receivers, who follow the course of manufacture of each assembly and could interfere in the manufacturing process if some deviations were detected, were sent on detached duty to all the companies without exception. Accepting a finished machine tool or line, the receiver had a good idea of what he was receiving. Thus, our specialists had the opportunity of studying the operating experience of companies in detail. They also became acquainted with the characteristics of its operation during testing of the equipment to be received. The receiver of equipment was usually an engineer or manager of the subdivision for which it was intended.

The duties of the receiver also included checking the quality of packing and the timeliness of dispatch of the equipment, he informed the central receiving group and through it the general director of the plant on each phase of manufacture, testing, acceptance and dispatch. Special receiving groups were created in West Germany, England and France to organize verification of acceptance and dispatch of equipment.

A central acceptance committee was created at Togliatti to accept the equipment from hundreds of Soviet suppliers. The system of working with Soviet suppliers was as follows.

The enormous flow of equipment, the multiplace nature if one can express it thusly, of each dispatched "unit," and making available storage locations--all this required creation of a clear coding system which would guarantee observance of the completeness of each unit and would serve as a basis for organization of storage, accounting and retrieval of each "unit" and of each crate contained in this "unit."

This system was created in cooperation with Fiat specialists. Each machine tool, each automatic line and each press had their own "surname, first name and patronymic," while each crate to be dispatched had a designation that confirmed its affiliation to one or another "family."

Approximately 300,000 of the 500,000 tons of the "zero" and first units comprised deliveries from the so-called Italian cluster. It contained all the American equipment which Fiat purchased with regard to the prohibition of the U.S. State Department to sell equipment directly to the Soviet Union.

The second, northern cluster of deliveries was comprised of England, West Germany, France, Sweden, Denmark, Belgium, Holland, Luxemburg and other countries.

It was decided to use the inland waterways for deliveries on broad scales. Specifically, all the equipment of the Italian cluster was hauled without transshipment to Togliatti from Genoa by ships of the "river-sea" class. Control of the equipment of the Volga Motor Vehicle Plant and the transport office of the All-Union Foreign Trade Association Avtopromimport, together with ministries of the maritime and river fleet, did an enormous amount of work.

It remained to solve a complex of very simple problems. The meteorological conditions of the different maritime and river basins had to be predicted with sufficient degree of accuracy. Officers had to be trained to accompany the ships under different conditions of the Mediterranean and Black Seas and the Sea of Azov and the Don River, Volga-Don Canal and the Volga River. Special ships and ports had to be prepared. Dispatching and tracking, unloading in the ports and delivery to the storage sites had to be organized.

The Italian "cluster" is hundreds of companies. If each of them were involved in dispatching its own equipment, confusion would have inevitably occurred. Fiat organized a special company in Genoa to dispatch the equipment for VAZ. Its duties also included verification of the condition of packing according to Soviet standards and information on dispatch of ships.

A total of five ships of the "Leninskiy komsomolets" class with displacement of 2,000 tons plied between Genoa and Togliatti during the entire 1969 navigation season, from early spring to late fall. Each ship made the round trip in 14 days. Practically all the 300,000 tons of equipment of the first unit had been transferred from the Italian coast by them in 1969.

Development of Togliatti Port dates to 1960. By the beginning of construction of the motor vehicle plant, it became one of the largest highly mechanized ports on the Volga River. Intensive construction of large chemistry, cement, machine building and electrical engineering enterprises in the town contributed to this.

VAZ required a significant increase of the capacities of the river port. New docks were constructed and powerful hoisting and transport equipment was installed that guaranteed intensive unloading of large volumes of cargo. The cargo traffic volume of the port doubled during the period of constructing the first unit of the motor vehicle plant alone. Later, when the plant began mass production of automobiles, the port collective took on itself transportation of a large number of automobiles on specially equipped ships to all ports of the Volga River and on ships of the "river-sea" class to Holland and Belgium without transshipment.

The flow of rail freight by the beginning of construction of the motor vehicle plant terminated at Zhigulevskoye More Station. The freight departed from here for Togliatti plants along lines laid from the station. The construction of VAZ brought to life a new railroad line with complex of all the necessary structures. In March 1967 the first diesel locomotives passed over this line. The new Togliatti Railway Station was constructed.

Three large bases were constructed to store the equipment. One of them was designated for engineering equipment and two were designated for unique imported production equipment. But this was not all. Sections of the areas in the plant buildings free of installation of the first unit became additional equipment storage zones.

All the large areas allocated for equipment storage--on bases and in production buildings--were divided into numbered squares. A card file was organized in which unit and each location of this unit of equipment was accounted for with indication of the storage squares. It was also indicated where each pallet was stored in this square--on the eastern, western, northern or southern side, and in the first or second tier. Retrieval of equipment was simplified and the possibility of losses was prevented.

A special transportation group was organized to deliver the equipment from the port and from the railroad station to the storage and installation zones and was transferred to the operational subordination of the chief of equipment control. The storage areas were also attached to the corresponding equipment control departments formulated on the specialization principle. The warehouse workers were operationally subordinate to the departments. The unified chain of orders, acceptance, storage and issue of equipment for installation was thus not interrupted at any time. The responsibility rested in the department chief, who was fully responsible for guaranteeing installation of equipment of a given profile.

This fact is indicative.

A total of three of three million crates was dropped and their equipment was damaged. One of these cases occurred when a crate with a machine tool was being delivered from the hold of a motor ship. The bottom in the crate collapsed and the machine tool fell out. Since the company was responsible for packing, then it had to make up the losses and deliver a new machine tool to the plant. Two other cases occurred through the fault of drivers. But even here the plant did not suffer any serious losses.

The losses were neither in storage, delivery to the installation zones or during the course of installation itself. A typical problem was to prevent combustion. The crates had to be sprayed with hoses for entire days during the summer. The quality of packing guaranteed preservation of the equipment.

From the Editors

B. M. Katsman's manuscript breaks off at this point. We unfortunately can only imagine how subsequent chapters would look. It is clear, for example, that the discussion would be about the period of installation of the equipment, about starting of the plant units, about assimilation of planned indicators and about establishment of the VAZ management system, which has now become the generally recognized model for copying. The journal has already published materials of other authors about this, but nevertheless it is hoped that there will be an opportunity to continue to illuminate the experience of the Volga motor vehicle giant.

PHOTO CAPTIONS

1. p. 156. Soviet Ladas were demon trated successfully in numerous international automobile showrooms.

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RAILROAD

RAILROADS' USE OF COMPUTER SYSTEMS DISCUSSED

Moscow ZHELEZNODOROZHNYY TRANSPORT in Russian No 11, 1981 pp 9-11

[Article by Yu. S. Khandkarov, Chief of the Main Computer Administration of the Ministry of Railroads: "Improving the Management of the Transport Process"]

[Text] One of the most important national economic problems posed by the 26th CPSU Congress was the more rational utilization of the nation's production potential. The basic aim of employing computers in rail transport is to solve this problem on a network scale by optimizing transport planning and the effective control of train and freight operations as well as automating the production processes at the enterprises. The sectorial automated system for the management of rail transport (ASUZhT) is being developed as a three-level system. On the first level, at the line enterprises (the stations, locomotive and car depots) and at the road divisions, information posts and enterprise ASU [automated control system] are being organized, on the second, in the railroad administrations, road computer centers have been developed designed to serve the employees of the rail administrations as well as ones for the rail divisions and marshalling yards for organizing the transport process. In addition, the railroad computer centers provide for the collection and preliminary processing of data for transmitting it to the upper level, to the Ministry of Railroads [MPS]. On the third level (at the MPS), they have organized the Main Computer Center [GVTs] which services the leadership of the ministry and for forecasting car flows and the arrival of freight, the road administrations, the transloading border stations and a number of junctions. At present we have completed forming the computer centers in all the railroad administrations and at the MPS. More than 2,000 line information posts have been organized and equipped.

The fixed capital of the computer system over the Tenth Five-Year Plan has tripled. During this period technical buildings have been constructed for the computer centers on the Northern, Southern Urals and Transcaucasian railroads as well as the building of the Express-2 System on the Moscow Railroad. On five railroads the first stage of the data transmission network has been put into operation and the introduction of the Express-1 System has been completed. Construction is being completed for the technical buildings of the railroad computer centers on the Sverdlovsk, Southwestern, Kuybyshev, Tselinnaya [Virgin Lands] and Northern Caucasus railroads and the GVTs MPS [Main Computer Center of the Ministry of Railroads] as well as the data transmission network on a number of railroads.

The third generation computers which exist in all the railroads of the network have been mastered. Using this equipment, each day around 1,300 problems are solved.

On 28 railroads, the first stages of the ASU have been put into operation. Due to strengthening the physical plant, the amount of work carried out by the railroad computer centers over the years of the previous five-year plan has risen by 2.8-fold while the proportional amount of the tasks directly related to managing the transport process has increased by 33 percent.

Basic attention and a large portion of the funds allocated for the development of the ASUZhT are aimed at creating automated information and reference systems designed to forecast the car flows, monthly and direct planning of operations, for monitoring the operation of locomotives and special rolling stock as well as for creating ASU for the marshalling yards. In addition, significant funds have been allocated for developing and introducing automated seat reservation and ticket sales systems for passenger trains, information and reference systems for monitoring and analyzing the failures and damage to equipment as well as planning their repair and preventive maintenance, in addition to systems for processing the statistical accounting data from transport operations and rolling stock utilization.

At the same time in recent years work has been done to develop system-wide software for the third generation computers and the physical plant of the ASUZhT has been strengthened.

All of this has made it possible at present to use computers to carry out a portion of the work involved in the monthly and annual transport planning. On all railroads using computers monthly plans are compiled with the isolating of irrational shipments. For seven railroads, a train traffic schedule is calculated for the double track sections and for nine railroads the monthly plans for outbound routing. The solving of these problems in 1980 alone has made it possible to detect and eliminate from the monthly plans irrational shipments of 19 million tons of freight, to raise the train weight standards by 50-100 tons on individual routes and to increase the section speed by 1-1.5 km per hour and the routing level by 2-2.5 percent.

The GVTs MPS each year calculates a network plan for forming up the trains and each month solves a number of problems in the summary freight shipping plan and certain problems for technical norming of railroad operations. In 1980, the elaboration of the technical documents was completed for calculating a train forming plan using the unified computer system and encompassing all the marshalling yards of the network and a number of the major section stations. This will make it possible to centrally calculate the train formation plan considering the intrarailroad connections.

During the 11th Five-Year Plan we intend to automate the calculations for the annual freight shipping plans. Simultaneously we intend to provide machine calculation of the car flows needed to draw up the train formation plan between all the marshalling yards. The full solution to this problem is possible in the instance that all the freight dispatchers will indicate the destination station in their shipping statements.

In 1980, the Computer Center of the Moscow Railroad improved the procedures and equipment for calculating the railroad monthly loading plans and in this year this will make it possible, along with planning loading for the departure stations, for the types of freight and cars and for the destination railroads, to obtain a plan for outbound routing, data for adjusting the train formation plans and controlling empty cars as well as data for calculating the monthly technical standards for railroad operations. At the same time, there are plans to realize machine control over the fulfillment of the monthly loading plan day by day and from the start of the month (for individual indicators) on the basis of computer processing on a real time scale the data from the primary accounting documents, that is, the stubs of the railroad reports.

The unified computer system will assume the calculating of the train traffic schedules, the technical standards for operations and the monthly plans for outbound routing. Thus, in the 11th Five-Year Plan we will solve the problem of automating the calculation of the basic planning and normative documents which control the transport process. Here an opportunity will be provided to make the necessary corrections in a dialogue mode with the computer during the calculation process. This will make it possible to create a flexible calculation procedure which optimally combines the capabilities of the computer and the needs of the user.

It is equally important to employ the computer in rail transport for optimizing the immediate control of train and freight operation. For this purpose all the railroads have set up and are operating the first stages of automated information and reference systems for supervising freight operations and the car fleet as well as systems for tracking the group refrigerator rolling stock, the large-tonnage transit containers and the traveling of locomotives to factory overhauls. On individual railroads there is a system of monitoring the closed circular routes.

Work to develop these systems is being actively carried out on many railroads. Thus, on the Belorussian Railroad the ASU is based on the collection of primary information directly from the stations. It provides on a near-to-real time for the generating of data on the forecasting of the car flows, the position and technical condition of the locomotives, loading and unloading, recommendations for the control of empty cars, current plans for the operation of the basic marshalling yards and so forth. Moreover, two times per day the recipients are informed of the arrival of cars for unloading.

Similar systems are being developed at the Gor'kiy and October railroads. Significant work to develop the automated information and reference systems has been carrie ried out on the Southern Urals, Sverdlovsk, Moscow, Kuybyshev, Northern, Southwestern, Tselinnaya and Eastern Siberian railroads. A number of railroads have created and are developing automated systems for controlling locomotive operations and these provide the operators of the traffic and locomotive services with data on the location of the locomotives and recommendations for turning them over to the planned types of technical maintenance.

The GVTs MPS also operates an information-reference system on freight and train operations of the railroads and this provides the leadership of the ministry and the Main Traffic Administration with data of operations analysis as well as information on the availability of loading resources on the network's railroads.

At present, the industry of the CEMA member nations has begun series production of third generation computers, teleprocessing systems, terminal microprocessor equipment and data transmission devices. This has helped to work out and widely introduce automated systems for direct control of the transport process. In 1981-1985, we also plan to set up such systems on all railroads which have the necessary physical plant. At the same time, there is to be a stage-by-stage transition to the collecting of primary information directly from the line enterprises (stations, locomotive depots and so forth) by the mass use of the Soviet-produced microprocessor terminal equipment of the SM-1800, Iskra-555 and Iskra-226 types. These devices make it possible to automate the recording of data in preparing (printing) the primary accounting document. This eliminates the necessity of additional manual labor for transferring the data from the primary document to the machine carrier and the time is shortened for transmitting the data from the point of origin of the information to the processing centers.

During the current five-year plan, terminals will be introduced for compiling the physical lists of the trains at the interroad transfer accounting stations and at the marshalling yards and then for keeping a train traffic log and compiling the railroad records. This will make it possible to organize direct control over train and freight operations.

The extensive use of the microprocessor terminal equipment will improve the system of operational statistical accounting for the operations of the railroads and enterprises and will make it possible to obtain the basic portion of operational information from primary documents at the points of its origin with a high degree of reliability. In this manner, conditions will be created for uniting operational and statistical reporting into a single system with the exclusion of all intermediate elements from the production process.

The automated system of operations control includes subsystems for monitoring the position of the trains and locomotives, for observing the train formation plan and the fulfillment of the outbound routing plan as well as supervising the individual types of rolling stock. On the basis of the information contained in the system, a forecast will be calculated for the arrival of trains, cars and freights as well as operational and daily-shift plans for the operations of the divisions and railroads.

The improving of marshalling operations is of important significance in organizing the transport process. The creation of the automated systems for controlling marshalling yards (ASUSS) is aimed at solving this problem. During the Tenth Five-Year Plan, ASUSS were introduced at 18 stations, at 2 stations they are in experimental operation and 7 stations are preparing to introduce them during the current year. There are also plans to introduce ASU at another 58 interconnecting marshalling yards located on the major runs. Such systems are being developed on the Gor'kiy, Kuybyshev, Moscow, Southern Urals and Sverdlovsk railroads and will be put into operation in 1981-1983, and in 1982-1985 on the railroads of Siberia, the Far East and the Ukraine.

However, for introducing the ASU it is essential to build technical buildings, significantly strengthen the communications network and organize and supply terminal equipment for a large number of information posts. At present industry is supplying the MPS with the needed amount of computers. However, the technical buildings for the computer centers are being built slowly. For a number of years the Mintransstroy [Ministry of Transport Construction] has not included these projects in its plans. In this manner the basis for the physical plant of the ASUZhT is undermined.

For improving passenger services, the automated seat reservation and ticket sales system operating at the Moscow junction continues to be developed. In 1980 alone, some 39 million tickets were sold with its aid. However, the system does not have sufficient productivity and for this reason a more powerful one is being developed and this should be put in operation in 1982. Similar systems will be created in the 11th Five-Year Plan in Leningrad, Kiev, Rostov and Sverdlovsk.

Measures are being carried out to improve services for transit passengers using ASU. Automated systems have been put into operation for processing the requests for a transit trip and return trip from eight major junctions and this has made it possible to presell to passengers at their permanent residence tickets for corresponding trains with connections at major railroad junctions and for the return trip to the place of residence (during business trips and leaves). At present, 16 railroads have been linked up to these systems. For the summer season the allocating of seats by reservation has increased by almost 10 percent for the railroads and the handling of these has been accelerated by 2-fold. At the same time, these railroads have begun to introduce automatic seat allocation systems for trains of their own formation. During this five-year plan, such systems should be introduced on all the railroads of the network.

The use of computers is being expanded for raising the reliability of equipment. At present, many railroads have developed and are operating systems for the following: analysis of damage and unplanned repairs of locomotives, diagnosis of the technical condition of diesels for diesel locomotives, analysis of failures in railroad car assemblies and STsB [signal, centralization and block system] equipment and so forth. The further development of these tasks is aimed at creating automated systems capable of producing recommendations and plans for preventive maintenance on the basis of analyzing the failures of assemblies and parts of rolling stock, the track superstructure, as well as the power supply and STsB equipment. Such systems are in the design stage.

For automating the most labor intensive processes of collecting, processing and analyzing the data on transport operations, a significant portion of routine jobs at the junction accounting freight offices has been turned over to computers. Here labor productivity has risen by 25-30 percent. With the aid of computers many railroads have organized the drawing up of statistical reporting on freight and passenger movements and the allocation of income from them. A number of railroads have automated the processing of data on the engineer routes and have created automated systems for monitoring the availability and movement of materials and spare parts at the main materials warehouses.

During the 11th Five-Year Plan we plan to automate these operations on all railroads. First of all, using computers the statistical reporting will be compiled on freight and passenger traffic on the basis of data concerning the actual amounts of the car and freight flows and needed to calculate the technical standards for operations, the monthly plans for outbound routing and for adjusting the train formation plan. These same data will be employed for analyzing freight operations and improving the planning of freight shipments.

For carrying out the designated measures the procedural materials and packets of applied programs are being worked out and the basic portion of these will be prepared in the next few years. Moreover, there are also plans to complete the changeover of all problems solved on second generation computers to the unified computer system. There is also to be a stage-by-stage transition to the mass use of microcomputers for automating the collection of data from the primary accounting documents at the point of origin of the information, the creation of a teleprocessing system capable of operating on a real-time scale for solving operations problems, the equipping of all the railroads in the network with the required corresponding range of computer equipment as well as the development and equipping of the network of information posts.

Thus, the basic resources of the computer system in the 11th Five-Year Plan will be aimed at creating automated systems to improve operational control of train and freight operations as well as developing the physical plant of the ASUZhT.

In the further development of the ASUZhT, we plan to introduce the devices presently being developed for automatically reading the locomotive numbers and then for reading the railway cars in the aim of creating a dynamic model of the location of the rolling stock in the MPS computer system. This will make it possible on a real-time scale to monitor the position and condition of the locomotives, cars and special rolling stock and to calculate the operations plans for the marshalling and freight yards as well as quotas for controlling the movement of trains and locomotives and allocating empty cars. We also plan to employ automatic locomotive control systems in driving the trains (the "autoengineer") and for controlling train traffic on the sections of a route.

The main task in improving the existing ASU is to develop the organizational and technical conditions for the prompt and high quality receiving of primary information by a stage-by-stage transition to collecting data at the point of origin using the microprocessor terminal equipment. Such work has been started on the Belorussian, October and Gor'kiy railroads. In the 11th Five-Year Plan we plan to begin automating the compiling and processing of data from the train schedules, the desk logs of the station and locomotive depot dispatchers, the railroad records and car sheets using microcomputers. The existing telegraph equipment will be employed for collecting and transmitting the data until the microcomputers are in use.

Work will be continued to improve the methods of data collection for the ASU. For this purpose we must analyze the flows of information, and above all those related to the operational control of the transport process. We must establish a firm procedure for collecting the data and clarify the rights and duties of persons engaged in these operations. Here the role of the clients will grow particularly. The ASU require attention and support from the first leaders of the sectorial services, the divisions and administrations of the railroads in all stages of creating the systems. This is an essential condition for the successful development of the ASUZhT.

For increasing the effectiveness of the existing ASU, measures have been worked out and are being implemented to improve the quality of the program complexes, to ensure the simplicity of following and adjusting the programs, to master the achievements of the system-wide software, to broaden the use of structural programming, systems for controlling the data bases, modern programming languages and so forth.

The 11th Five-Year Plan is an important stage in developing the ASUZhT. Along with solving many complex technical problems, major organizational measures must be carried out aimed at ensuring the dependable work of the microprocessor terminal equipment which will be widely employed at the line enterprises such as stations, locomotive and car depots, permanent way divisions, in the freight accounting offices, at materials warehouses and so forth.

For carrying out the Decree of the CPSU Central Committee and the USSR Council of Ministers "On Measures to Improve Work and Fully Develop Rail Transport in 1981-1985," a special program has been worked out and is being implemented aimed at creating new and developing existing automated systems for complete calculations of the shipping plans, the technical standards for operations and the outbound routing plans. Moreover, measures have been outlined to improve the systems for operations forecasting and controlling operations of the railroads and divisions, including the creation of a network of ASU for the marshalling yards encompassing 75-80 stations located on the major routes, for seat reservations and ticket sales as well as for monitoring the condition of the equipment and the use of rolling stock. For this purpose, we plan to strengthen the physical plant of the ASUZhT primarily by building the technical buildings for the road computer centers and developing the data transmission network. We also plan to broaden scientific research and design work in the area of the problems of the ASUZhT including for automating the control of breaking up the trains on humps, train traffic in a section and locomotive control.

As a result of the development of the ASUZhT and the broad use of microprocessor equipment, we should reduce the turn-around time of the cars, increase locomotive and labor productivity, reduce breakdowns and damage to transport equipment as well as improve the utilization of passenger train cars.

For the ASU which are part of the second stage of the ASUZhT, procedural materials and packets of applied programs are being worked out and the basic portion of these will be completed in 1981-1983. Considering the introduction of the unified computer system on each railroad by this time, it is essential to take measures to unconditionally ensure the carrying out of the tasks aimed at creating the automated systems for operational control and the ASU of the marshalling yards.

The specific task stemming from the decisions of the 26th CPSU Congress demand that the workers of the computer system further improve organizational work and develop creative initiative.

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PLANS TO PROVIDE RELIABLE TRANSPORTATION SERVICE TO WESTERN SIBERIA DISCUSSED

Moscow ZHELEZNODOROZHNYY TRANSPORT in Russin No 1, 1982 pp 11-14

[Article: "Reliable Transportation Service to Western Siberia"]

[Excerpt] It is noted in the decree that the party oblast committee, being guided by the instructions of Comrade L. I. Brezhnev expressed in the Annual Report of the Central Committee at the 26th CPSU Congress and during his trips to Siberia and the Far East, by party and government decrees on the problems of development of transport, intensified attention to the activity of the party organizations of this sector and strengthening of its material and technical base. The basic funds of the transport enterprises increased by 35 percent during the 10th Five-Year Plan and a number of railway lines and junctions, airfields, river piers and highways was constructed and reconstructed.

Measures have been adopted recently to improve the structure of party organizations and new party groups, shop and primary party organizations and junction party committees have been created. More than 85 percent of the communists involved in transport are laboring directly in production subdivisions and are showing the example in work and in their social life.

The decree also points out a number of deficiencies, aims toward elimination of them and toward a further increase of the level of the party management of enterprises and organizations of transport in the sector. The corresponding commissions have also been given to transport ministries. They have specifically been given to the Ministry of Railways to consider in detail the activity of subagency enterprises and organizations and jointly with the Novosibirsk Oblast Party Committee and the oblispolkom to work at specific measures to improve the efficiency of utilization of rolling stock, to improve passenger shipments, to accelerate technical re-equipping and reconstruction and to strengthen discipline in all sections of the transport conveyor.

Novosibirskaya Oblast is one of the largest in the region and the Western Siberian Railroad is one of the most freight-intensive in the network. It performs an enormous volume of loading, including the most important mass freight and unloading, admits transit car traffic volume, transships freight and the passenger shipments here are increasing continuously.

The board of the ministry considered the problem of measures to improve the work of the Western Siberian Railroad. It was noted at a meeting of the board that the railroad collective, fulfilling the decisions of the 26th CPSU Congress and the instructions of Comrade L. I. Brezhnev, are taking the work to improve transport service of the national economy and the populace under the supervision of party organizations. On the whole the tasks of 9 months of last year in shipment of freight was fulfilled by 125 percent throughout the railroad. The plan of timber, grain, provisions, nonferrous metals, chemicals, industrial raw materials, construction materials and other shipments was overfulfilled. The movement of car traffic volume and the use of rolling stock were improved. The turnover of a rail car was accelered by 0.34 day compared to the corresponding period of 1980, the average idle time of a rail car at service stations was reduced by almost 0.4 hour and the idle time for a single loading operation was reduced by 1.6 hours. The route and section traffic speeds of trains were increased considerably. The average daily productivity of a locomotive was increased by 4.4 percent, although the task was not fulfilled by this indicator.

The socialist competition for successful fulfillment and overfulfillment of the tasks of the 11th Five-Year Plan and for increasing the efficiency and quality of work was expanded at enterprises of the railroad. The complex brigade of duty officer V. M. Kuz'min at the Inskaya Classification Station came out with a valuable initiative, approved by the Novosibirsk Oblast Party Committee and which received a positive evaluation in the indicated decree of the CPSU Central Committee. Its experience of rapid high-qulaity forming up of trains, improvement of technology, a purposeful search for new production reserves at the initiative of party organizations is achieving broad distribution in the oblast and on the railroad and in all facilities.

One of the first calls of V. M. Kuz'min's brigade in the track facilities was supported by collectives of the Altay and Inskaya maintenance sections and track machine station No. 19. The track workers saved more than 40 hours for train traffic due to accelerated replacement of switch settings and span structures of small trestles alone during combined "windows" on the most freight-intensive line of the Omsk-Novosibirsk Railroad. Output during one hour of a "window" exceeded the norm by 30 running meters throughout the railroad as a whole, while the traffic speed after completion of repair work on the main course was set up to 70 km/hr.

It was noted in the decree of the CPSU Central Committee that the Novosibirsk Oblast Party Committee adopted measures to strengthen the creative ties of the transport enterprises to the Siberian Department, USSR Academy of Sciences, and other scientific institutions located in the oblast, which contributed to solution of a number of problems of development of transport. If one talks about the cooperation of railroad workers, scientists, designers and planners, then it yielded the greatest results in the field of reducing transport delays, increasing the carrying and load capacities of lines and increasing labor productivity. The collective of the Western Siberian Railroad is successfully developing ties with specialized scientific and academic institutions, specifically with the Novosibirsk Institute of Railway Transport Engineers (NIIZhT) and the All-Union Scientific REsearch Institute of Railway Transport Engineers

(VNIIZhT) of our sector. Thus, the engineering and technical personnel of the railroad and workers of VNIIZhT have developed and introduced a complex technique for organization of local work, which permitted acceleration of handling of a local rail car by 0.22 day during 9 months of 1981 compared to the corresponding period of the previous year and to increase somewhat unloading with a reduction by almost 1,000 rail cars with local freight.

At the same time, the board of MPS [Ministry of Railways] pointed out significant deficiencies in the operational work of the Western Siberian Railroad, maintenance and use of hardware, organization of passenger shipments, capital construction, observance of labor and production discipline and so on. These deficiencies, it was emphasized at a meeting of the board, are thoroughly revealed in the considered decree of the CPSU Central Committee, implementation of which at all enterprises of the railroad under the supervision of party organizations will permit a more specific, more purposeful and more businesslike solution of the problems posed to the collective for the 11th Five-Year Plan.

What primarily needs to be done and on what should the main efforts of party, trade-union and Komsomol organizations, economic managers and each railroad worker be concentrated?

The main thing of course is unconditional fulfillment of the state plan for freight shipments in all nomenclature, by each division and for all stations. Unfortunately, the plan for dispatch of petroleum goods--goods of primary importance--was underfulfilled by 870,000 tons during 9 months of last year and the Omsk and Altay divisions and more than 50 stations did not cope with loading. And after all, the rates of growth of shipments on the Western Siberian Railroad, according to the five-year plan, is higher than the average network rates and in this case the dispatch of fuel, metal and timber should be increased especially intensively.

Together with related workers, much remains to be done in the field of making freight shipments more efficient. More than 160,000 tons were transferred to motor transport and almost 300,000 tons of freight were transferred to water transport during 9 months of last year. Nevertheless, inefficient shipments by rail are being reduced slowly. It is sufficient to say that it transports up to three million tons of various petroleum products at present parallel to pipelines alone. Further increasing the efficiency of shipments and more effective distribution between different types of transport in Western Siberia is perhaps one of the greatest reserves for reducing transport delays and for improving the use of transport hardware. Analysis showed that there are more and more opportunities during the current five-year plan to transfer a minimum of 500,000 tons of freight to motor transport, 1,250,000 tons to river transport and 350,000 tons of freight to pipeline transport. Inefficient shipments by rail will be reduced by 500,000 tons alone in Novosibirskaya Oblast.

The railroad collective is faced with important tasks in the area of improving the organization of shipments and improving the use of hardware. Special developed organizational and technical measures envision the solution of many problems related to increasing the level of operational activity and it is now important to take this work under strict control.

It is planned in the near future to revise the corresponding railroad instructions with regard to changes in the system of information communication and accumulated experience and to constantly increase the reliability of information about rail cars and trains to increase the quality of shift-daily planning of train and freight work. Automated control systems will be introduced and a data transmission network will be created for operation of an ASU [Automated control system] of the shipment process in 1983-1984 at the Vkhodnaya, Inskaya and Altay classification yards.

To accelerate deliveries of freight to customers, it was decided, utilizing the experience of the collective the Moscow Railraod, to ship no fewer than 30 million tons of national economic goods annually in trains of increased weight. Work will be continued for this purpose to supplement underweight and not fully complemented trains coming from adjacent railroads, parallel weight norms have been increased, forming up and admission of long-car trains have been organized on the Central Siberian Line and it is planned this year to guarantee clearance of coal block trains weighing 6,000 tons or more on a number of lines.

The idle time of rail cars on spur tracks of enterprises, serviced by the Western Siberian Railroad, exceeded the norm by 2.6 hours according to the results of 9 months of last year and as a result enormous loading resources were lost. It was decided to work out new unified production processes for the work of Iskitim, Chemskoy and Izynskiy stations and a number of stations of the Novosibirsk junction with large transport facilities to improve the interaction of stations and spur tracks.

The need for broad introduction of container, packet and other progressive methods of freight shipment was pointed out in the considered decree of the CPSU Central Committee. The railroad collective planned to increase the volume of freight shipments in large-capacity containers by 80 percent alone in 1985. Additional cranes are being installed at Kleshchikha and Omsk-Vostochnyy stations for handling them. The handling capacity of container platforms will be increased by no less than 10 percent at Tatarskaya, Barabinsk, Kleshchikha and Novosibirsk-Vostochnyy stations due to reconstruction. Freight shipments in packets will increase to approximately 3.5 million tons by the end of the five-year plan.

It is planned to construct raised tracks at Barabinsk and Bagan stations in 1983 for unloading coal and construction goods. Gantry cranes equipped with plate vibrators will be used at some stations to mechanize unloading of bulk freight and to clean gondolas. During the five-year plan the railroad will receive a total of more than 150 hoisting machines and mechanisms and the level of mechanization of loading and unloading operations at local-use sites of stations will be increased to 95 percent.

It was decided to transport approximately 780,000 tons of freight above the technical norms annually by using consolidated loading. The planned introduction of local technical norms will permit release of no fewer than 550 rail cars for additional shipments during the current year alone. The static loading of a rail car will increase by 30 kg annually.

Much remains to be done in the field of increasing the quality and of reducing the deadlines of repair and maintenance of freight cars. It has already been planned to reduce the idle time of rail cars in depot repair in the near future by 5 percent compared to the norm and the time of handling rolling stock at maintenance stations will be reduced by an average of 3 minutes. Stationary installations for testing the automatic brakes will be put into operation at Irtysh, Kombinatskaya and Rubtsovka stations. It is planned to install rail car repair machines at five stations. The continuous method of container repair should be introduced at the Bolotnaya Rail Car Depot in 1984.

Hoisting repair at the Altay Depot and extensive routine maintenance of the VL80T electric diesels at the Karasuk Depot must be assimilated to improve the current state and repair of locomotives. A service station for locomotives of the Plauen type is being turned over for operation at Isil'-Kul. A continuous line for dissassembly and assembly of wheel-motor units will be turned over for operation at Moskovka Depot and a line for repair of traction engines and wheel pairs will be turned over at Rubtsovka Depot. The locomotive brigades of the railroad have decided to save 10 million kW·hr of electric power during the current year by using advanced methods of driving trains and of returning 70 million kW·hr to the contact network by using regenerative braking.

According to the indicated decree of the CPSU Central Committee, in which the need to raise the overall skills of passenger service is emphasized, a complex of measures to improve organization of passenger shipments is planned on the railroad. Stations will be constructed in the near future at Barabinsk and Kalachinsk and it is planned to expand the location of cashier windows for preliminary sales of tickets at Novosibirsk and an additional seating platform with an exit to a footbridge will be turned over for operation at Novosibirsk Glavnyy Station. Six sections of train No. 111/112 will be converted to electric heating by the Novosibirsk-Adler line. Hourly delivery of tickets to the home will be introduced this year at Novosibirsk, Omsk and Barnaul. Station installations for outside washing of cars of electric rolling stock will be installed at Omsk and Barnaul at the end of the five-year plan. Suggestions for optimization of passenger traffic flows are being developed with regard to construction of a subway for more uniform distribution of suburban passengers along stations of the Novosibirsk junction. Monitoring is being intensified and the material interests of railroad workers are being increased to fulfill the traffic schedule of passenger trains.

Large funds are being allocated during the current five-year plan for development and technical re-equipping of the economy of the Western Siberian Mainline Railroad. They are directed toward intensification of the carrying capacity of freight-intensive lines, increasing track reliability, increasing the production capacities of the locomotive, rail car and freight facilities and acquiring new equipment. There is not a single sector of the railroad where new construction would not be carried out, where scientific and technical progress would not be developed and where technology would not be improved.

Special attention was devoted in the decree of the CPUS Central Committee "On the work of the Novosibirsk Oblast Party Committee to manage party organizations of transport enterprises in light of the instructions of the 26th CPSU Congress" to creation of the necessary production and cultural-service conditions for workers, more complete satisfaction of the needs of transport workers and members of their families for housing, preschool and medical institutions and expansion of the network of pensiones. rest homes, public catering enterprises and auxiliary facilities. The board of MPS has devoted primarily attention to these problems. It is now important to establish continuous, strict control over construction and reconstruction of all social facilities, achieving total assimilation of the funds allocated for these purposes and timely introduction of them into operation.

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BRIEFS

MOSCOW AREA FREIGHT SHIPMENTS--All types of transport have achieved further development since previous elections to local Soviets. The plans of the Moscow Railroad and water transport have been successfully fulfilled. A total of 1.7 million persons are dispatched daily through the nine Moscow stations. The volume of shipments was increased by 1.3 percent at the Moscow Water Transport Junction. Motor transport is occupying an ever-greater position in freight shipments. A total of 69 percent of the main motor shipments in the city is carried out by Glavmosavtotrans [Main Administration of Automobile Transportation of the Mosgorispolkom]. Its facilities transported 418 million tons of freight over a period of 2 years. Servicing of the populace with municipal passenger transport was improved. The fleet of the rolling stock of the subway, trolley buses, buses and compact and express taxis was increased by 717 units. An average of 14.9 million persons is transported per day by all types of municipal transport. Reconstruction of municipal mainlines, construction of overpasses and underground tunnels for motor transport and intersections for squares and streets contributed to improvement of the operation of transport. A total of 41.5 kilometers of trolley bus lines, five underground intersections and a transport intersection at different levels of the Kashir-Rublevo Mainline with the Kiev line of the Moscow Railraod was constructed and reconstructed. A total of 36 new routes of surface transport was organized. Means of communication continued to be develoepd. The total volume of communications products was increased by 7.7 percent compared to 1979. ATS [Automatic telephone exchanges] with capacity of 229,600 numbers were introduced during these years. The number of installed telephones of the populace was increased by 8.8 percent. Moscow now has direct automatic telephone communications with 183 cities of the country. [Text] [Moscow MOSKOVSKAYA PRAVDA in Russian 3 Jun 82 p 2] 6521

HELICOPTERS AT VAZ--Togliatti--The rhythmic operation of the conveyor of the Volga Motor Vehicle Plant imeni 50-letiya SSSR is now unthinkable without the assistance of civil aviation. VAZ [Volga Motor Vehicle Plant] has a large number of related facilities. Makeup parts are delivered to the plant conveyor by means of aircraft helicopters of the Privolzhsk UGA [Administration of Civil Aviation] from a number of enterprises, for example, from the Belibey Automotive Standards Plant and the Balakovo Mechanical Rubber Articles Plant. This not only guarantees a reliable supply of parts but is also economically advantageous. It has been calculated that aviation shipments save the plant approximately 150,000 rubles annually. The volume of these shipments was recently increased This is related to the fact that the plant has begun serial assembly of a new model of the Volga low-series vehicle on the conveyor--the VAZ-2107 Zhiguli automobile. [Text] [Moscow VOZDUSHNYY TRANSPORT in Russian 1 Apr 82 p 4] 6521

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